

Spring 5-1957

Volume 68 - Issue 8 - May, 1957

Rose Technic Staff

Rose-Hulman Institute of Technology

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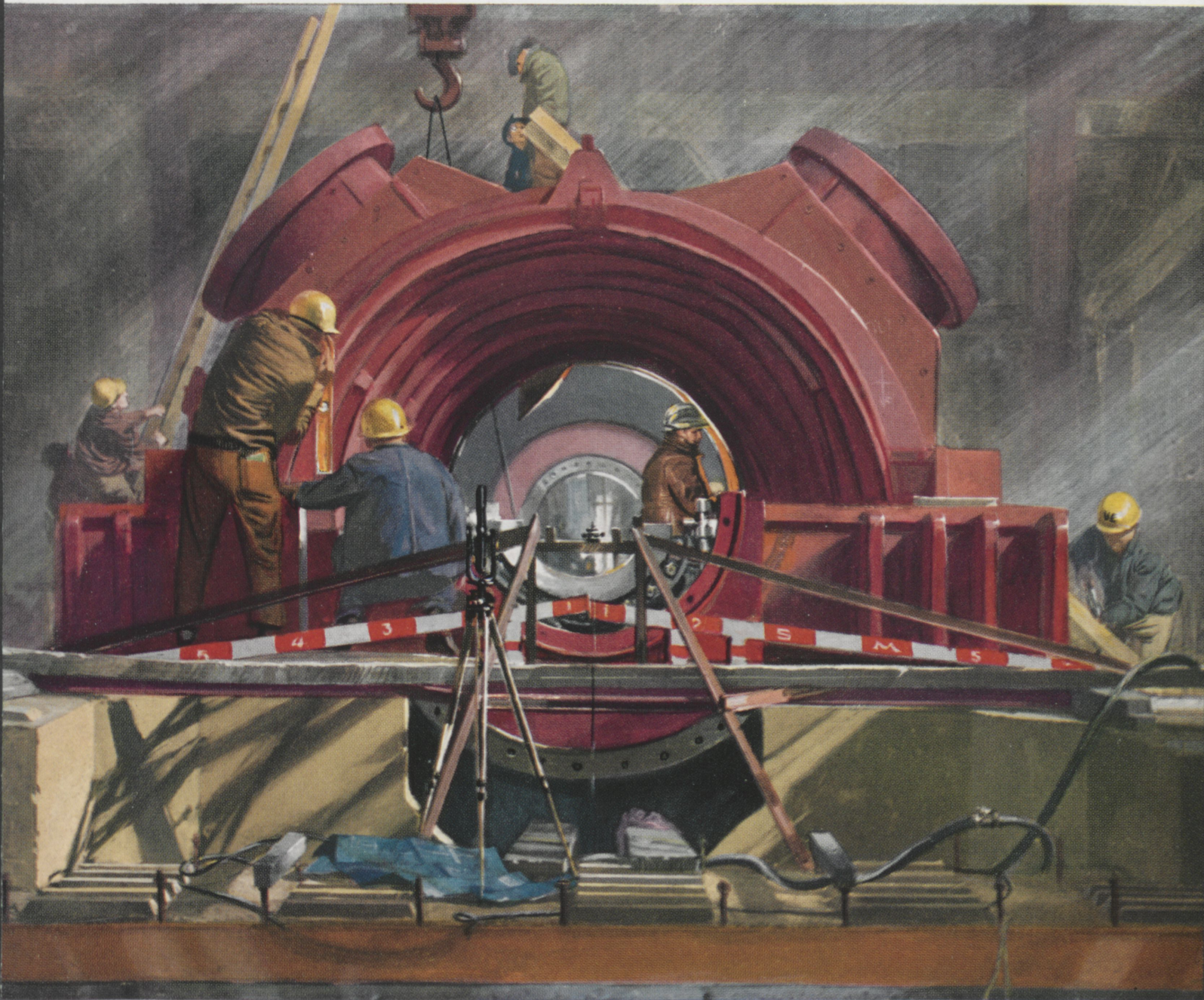
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Rose Technic

May 1957



In This Issue:

A LETTER FROM THE PRESIDENT
THE EARTH TAKES INVENTORY
THE ENGINEER'S BRIEF CASE

Harry M. Crooks, class of '49, speaks from experience when he says:

“At U. S. Steel there is a wide and varied choice of opportunities offered, under the most agreeable working conditions.”



THE RAPID RISE of Harry M. Crooks to his present responsible position is typical of that experienced by many hundreds of college graduates who have joined forces with U. S. Steel.

Presently Assistant Superintendent of the Power and Fuel Department, National Works, National Tube Division of United States Steel, Harry M. Crooks graduated in January, 1949 with a BS degree in Mechanical Engineering, after serving three years in the U. S. Navy. He started with U. S. Steel on February 1 as a student engineer. Within a year-and-a-half he was made Process Engineer in the Power and Fuel Department, and ten months after that, Power Engineer.

After three years as Power Engineer, he was promoted on March 1, 1954 to his present job as Assistant Superintendent, with a wide range of responsibilities, including all power

and fuel utilities throughout the large National Works plant. This position includes supervision of mill and furnace air supplies for the steel-making process, steam and mixed gases for power, and open hearth oil and tar. In carrying out this work, he supervises a force of 250 men.

Mr. Crooks decided to work at U. S. Steel because he felt that U. S. Steel had one of the finest training programs available in industry today. During his training, he arrived at the personal conclusion that, being an engineer, his best opportunities were in the operating branch of the steel industry.

Quoting Mr. Crooks: “Through the training received at the mill, the engineer has the opportunity to work in and become acquainted with every phase of steelmaking and with every department of the plant.”

If you are interested in a challenging and rewarding career with United States Steel, and feel you can qualify, get in touch with your placement director for additional information. We shall be glad to send to you our informative booklet, *Paths of Opportunity*, on request. Write to United States Steel, Personnel Division, Room 1662, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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of your engineering career*
ONE OF A SERIES

go where engineering is interesting

It's basic that you'll get more fun out of working on interesting projects than on stodgy ones. So it makes sense to choose a company and an industry in which you'll draw engineering assignments that give you excitement—and professional satisfaction. That way, you'll get more fun out of life, and advance faster, too.

It just so happens that Boeing offers you assignments on some of the most interesting projects in the country. For instance—an advanced supersonic guided missile weapon system; the 707, America's *first* jet transport; the revolutionary B-52 eight-jet nuclear weapons carrier; the KC-135 jet transport-tanker, and top-secret research projects.

There's a whole world of opportunity for you at Boeing, in research, design, manufacturing or service. Boeing's growth (400% *more* engineers today than 10 years ago) creates an expanding need—and long-range opportunities—for engineers of all kinds: electrical, mechanical, civil, aeronautical, industrial, or related fields, and for mathematicians and physicists.

At Boeing you'll enjoy high starting salaries, career stability, retirement and pension plans, company-paid opportunities for graduate study, and a host of additional benefits!

*NOW is the time to start planning ahead.
Consult your Placement Office, or write:*

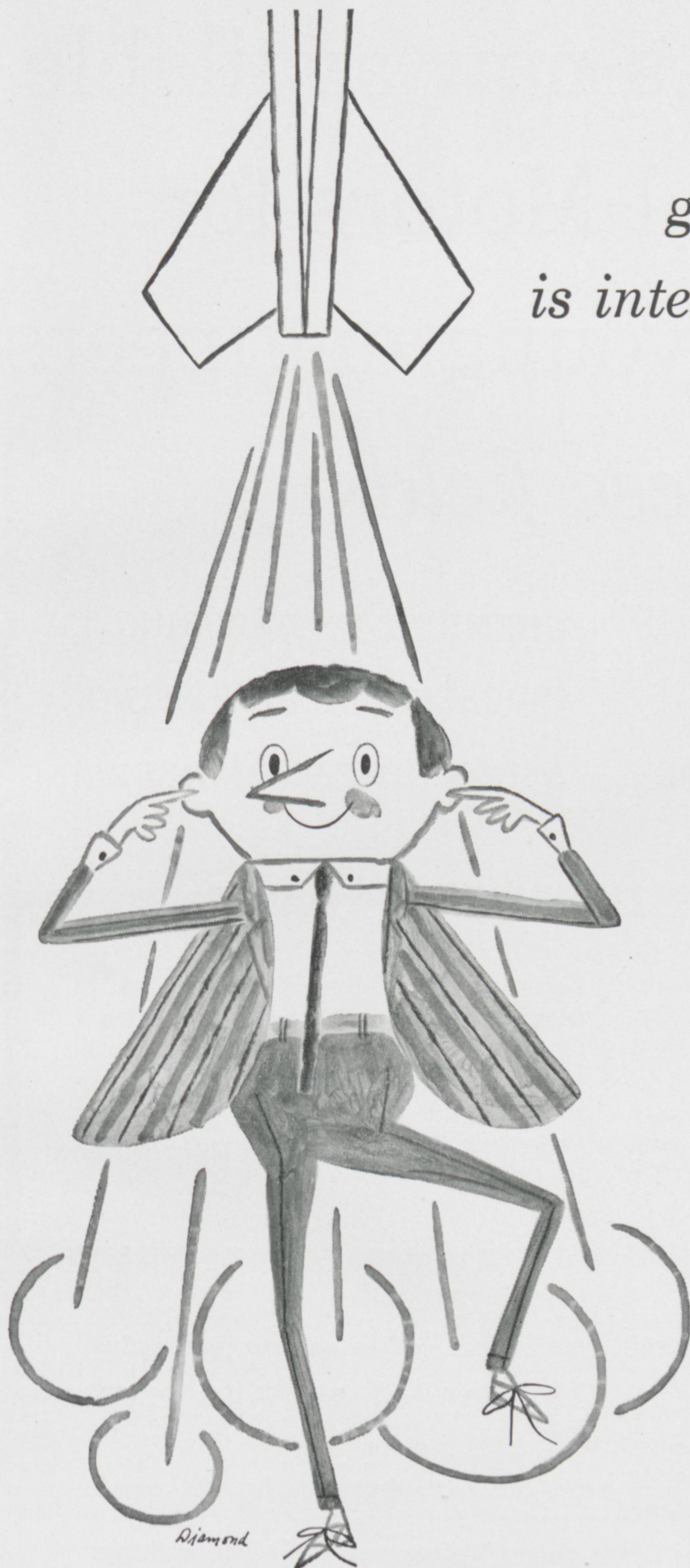
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IF YOU BELIEVE you can help General Motors maintain its leadership in a variety of technical fields—if you are confident you can help General Motors continue to produce *more and better things for more people*—here's what we urge that you do:

Either ask your Placement Office to put

you in touch with us, or write us directly.

Why not do it today—while it's on your mind?

• • • •

IMPORTANT: 4-page leaflet, "A Summary of Job Opportunities in General Motors," gives you the whole exciting story in capsule form. Write for it today!

GENERAL MOTORS CORPORATION

Personnel Staff, Detroit 2, Michigan

Rose Technic

VOLUME LXVIII, NO. 8

MAY, 1957

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Cover

"Seated on its base of reinforced concrete, the cylinder casing of a massive steam turbine is aligned with painstaking care. In this painting Stanley Meltzoff catches the force and drama so typical of expansion within the electric power industry. Reproduced through the courtesy of United Engineers & Constructors Inc. of Philadelphia, Chicago and New York".

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NICE WORK ON A HOT SUMMER DAY

THE temperature at altitudes of 36,000 feet and above goes far below zero, so it's standard procedure to demonstrate the starting capabilities of modern jet aircraft engines in a man-made "climate" of a brisk minus 67°F.

At Allison, demonstration tests are run periodically on both military and commercial aircraft engine models in cold weather tanks like the one shown above.

And, how do they get the tank's inside temperature down to the required 67° below zero? Here is one way Allison engineers do it. Outside air is cooled first with air-to-water heat exchangers. Then, a mechanical refrigeration system takes the air temperature to below zero. For the third step, the cold air is run through a turbine section of an Allison T-38 engine. As the gas expands, it comes out at about a minus 130°F. There is some warming as the air is piped to the cold tank, but usually, warm air has to be added to bring the tank temperature UP to a minus 67° Fahrenheit!

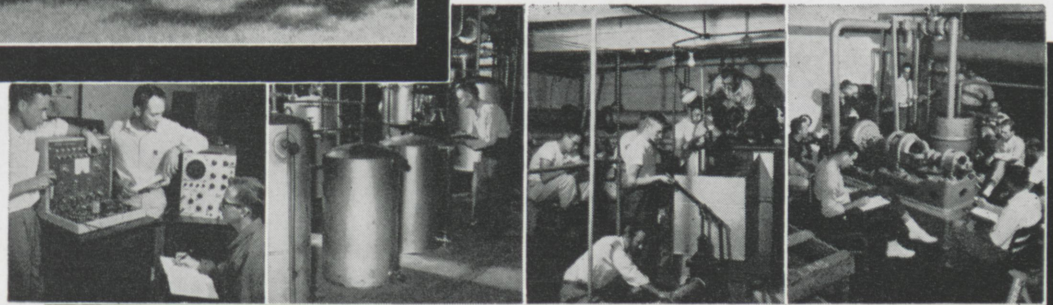
Fuel and oil tanks are located inside the test chamber, and they—with the engine—are permitted to "soak" in the frigid temperature before firing up. Tests of 72 hours "soak" duration have been made on Allison Prop-jet engines. Of course, the front opening is clamped shut for the test, and performance is checked by remote controls. But, occasionally, it's necessary for an engineer to "bundle up" and go inside the cell. It's nice summer work.

★ ★ ★

Allison now is in the midst of an engineering expansion and development program representing an expenditure of \$75 million. Completion of the program will make the Allison engineering Research and Development Center one of the most complete in the world . . . an ideal place to apply your academic training. Write for information about your future career at Allison: Personnel Dept., College Relations, Allison Division, General Motors Corporation, Indianapolis 6, Indiana.



ROSE



ROSE POLYTECHNIC INSTITUTE

TERRE HAUTE, INDIANA

Office
OF ADMISSIONS

ROSE POLYTECHNIC
INSTITUTE
TERRE HAUTE, INDIANA

HIGH SCHOOL GRADUATES OF 1957

You are cordially invited to visit Rose Polytechnic Institute where you can earn a degree in:

CHEMICAL ENGINEERING
ELECTRICAL ENGINEERING
MECHANICAL ENGINEERING
CIVIL ENGINEERING

*The next freshman class will be admitted
September 9, 1957*

"If I were in your place..."

"This model represents one of the outstanding developments of the aircraft industry, the Snark intercontinental guided missile. It illustrates a point that I think is important in choosing a career after you are graduated. Young graduates of only a few years ago are responsible for the dramatic accomplishments of the Snark.

"Even more startling things are on the boards... and consider all the possible challenges to the imagination. For example, thousands of newly-conceived formulas were considered before the Snark's guidance system was perfected! Hundreds of young engineers, like yourselves, contributed their fresh ideas in the process. Although young, these men are now veterans in this important field. Yet we all know that missile development is still in its infancy.

"It was this tremendous opportunity for individual initiative that attracted me to the aircraft industry. And if I were in your place today, I'd certainly look into it seriously as a most promising career possibility."

At Northrop Aircraft you'll be with a hard-hitting pioneer company that has won distinction in manned aircraft and guided missile production. Among the high-priority projects that will appeal to your ambition and ingenuity is Northrop's Snark SM-62, the first intercontinental guided missile designed for assignment to the Strategic Air Command of the U.S. Air Force.

Other significant Northrop accomplishments are the development of boundary layer control to improve aircraft range performance, and the first operational inertial and celestial guidance systems. Still another project to tax your imagination and skill is Northrop's new supersonic jet trainer, the T-38, now being developed for the Air Force.

In Northrop's great new multi-million-dollar engineering center at Hawthorne, you'll be associated with experienced engineers and scientists who will respect and encourage your initiative, enthusiasm and ability.

You will also enjoy many financial advantages that are considered outstanding in the industry... liberal salary, security benefits for yourself and family, and a company-paid program for continuing your engineering studies.

Write now and ask us questions as they apply to your engineering objectives. Tell us your ambitions... we believe we can relate them to opportunities at Northrop. Address Manager of Engineering Industrial Relations, Northrop Aircraft, Inc., 1019 East Broadway, Hawthorne, California,



NORTHROP

NORTHROP AIRCRAFT, INC., HAWTHORNE, CALIFORNIA
Builders of the First Intercontinental Guided Missile

Questions students ask Du Pont

—and some of the answers in summary form



"Do you hire men who have definite military commitments?" asks Oran A. Ritter, Jr., of Louisiana State University.

Yes, because Du Pont has always been interested in men on a long-term basis. Du Pont has employed many graduates with military commitments even though they were due to report for duty a few weeks after joining the Company.



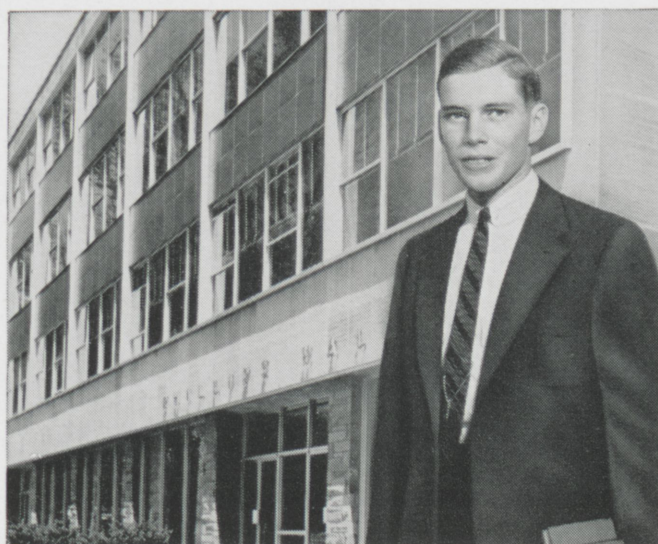
"Would a graduate degree help my chances for advancement at Du Pont?" asks John C. Nettleton, of Villanova University.

Many factors are involved, and an advanced degree would undoubtedly have a favorable effect in all technical work, but it would probably be of more direct benefit in research or development at Du Pont than in production, marketing or sales.



"Where would I work for Du Pont?" asks Gaylord E. Moss, of Tufts College.

Du Pont has more than 140 plants and research and development laboratories scattered through 26 states. If you have a definite preference, and Du Pont has an opening there for which you're qualified, your chances of getting it are good.



"How are chances for advancement in a large company like Du Pont?" asks Herschel H. Loomis, Jr., Cornell University.

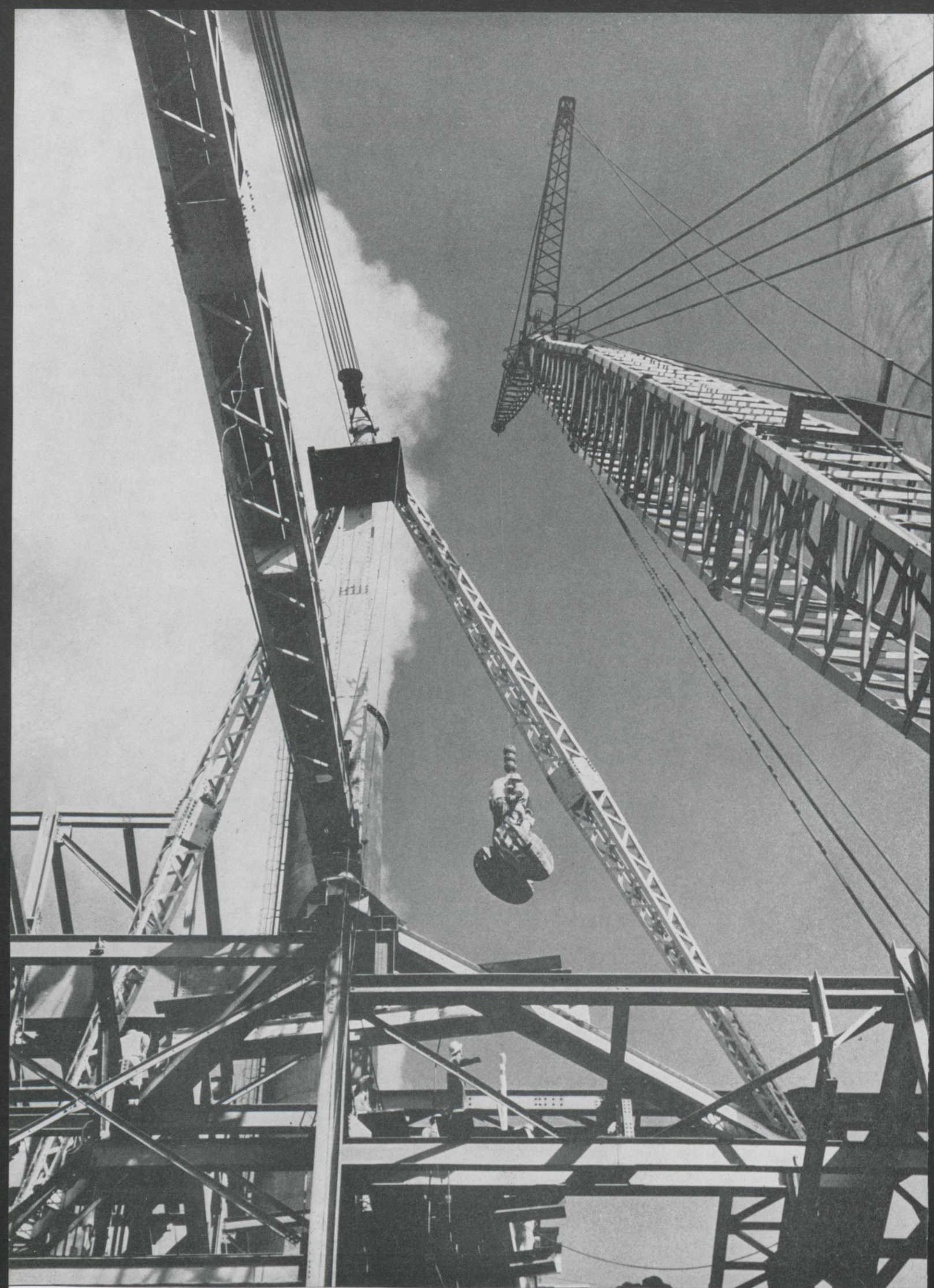
Good! Du Pont is large, but it's made up of 11 independent departments — like smaller companies — under one management. And it's a basic policy to promote from within and on merit as Company growth creates openings.

We can give only brief answers to these questions in this space. But we'll be glad to answer them more fully, and to try to answer other questions you may have that bear more directly on your own future. Why not write us today? Address: The Du Pont Company, 2507C Nemours Building, Wilmington 98, Delaware.



BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

WATCH "DU PONT THEATER" ON TELEVISION



"Honor, Justice and Courtesy"

For the past several years, various attempts have been made at bringing the Honor System to Rose. Always, the interest has been slight and little progress has been made.

Perhaps the failure of previous attempts could be attributed to the fact that we don't realize what the Honor System is and what it would mean to you and I, the students of Rose Polytechnic Institute.

The Honor System is based on the cardinal principle that it is dishonorable for any man to receive credit for work which is not the result of his own efforts. That is a principle which members of the engineering profession must carry through life. To be trusted as a gentleman, to have your own word of honor your bond, will increase your self respect. Only in a atmosphere of mutual trust can a man develop to his fullest maturity.

"Honor, justice, and courtesy form a moral philosophy which, associated with mutual interest among men, constitute the foundation of ethics. As the keystone of professional conduct is integrity, the engineer will discharge his duties with fidelity to the public, his employers, and clients, and with fairness and impartiality to all."

The responsibilities of an engineer demand that he set for himself a code of ethics based on the principles of integrity, common sense and respect for civil law. Industry has pointed out vividly that it respects the Honor System, which is supported by reports from Stanford University, Virginia Polytechnic Institute, Stevens Institute of Technology, the University of Michigan and many others.

By allowing the student to talk, smoke or leave the room during an exam, the System reduces pressures brought about by proctors. Dishonest acts, putting honest students lower on the grade scale would be eliminated.

It may be pointed out that the Honor System allows considerable freedom but we must realize that such freedom is accompanied by the responsibility of maintaining the atmosphere of mutual trust within which such a system must function.

The installation of the Honor System here at Rose would necessitate a great deal of cooperation between faculty and students. While most professors permit, and even encourage in some cases, old exams and reference books, several improvements could be made by changing lab experiments and exams to a greater extent each year.

Without a doubt, Rose students can be justly proud of their Institute as it is but the Honor System could promote a degree of school prestige and personal pride never before attained. At the end your diploma would be no mere certificate of tasks accomplished; it would stand as evidence of your achievement of character.

D.G.M.

Frontispiece: High elevation equipment being used in the construction of the American Gas and Electric Company's Muskingum River Plant. The generating station, located at Beverly Ohio, will employ two 225,000 kw units.



IMPORTANT ON-CAMPUS INTERVIEWS FOR POSITIONS AT

NORTH AMERICAN'S COLUMBUS DIVISION

North American Aviation, foremost in the design and production of military aircraft, has an established engineering team at its Columbus Division with prime responsibility for complete design and development of Navy aircraft.

The New FJ-4—Navy's latest and fastest FURY JET—is the most recent achievement at Columbus. Other, even more advanced designs are now being developed from initial concept to actual flight...creating top opportunities for virtually all types of graduate engineers.

Contact your Placement Office for an appointment with North American representatives.

Or write: Engineering Personnel Office, Dept. COL, North American Aviation, Columbus 16, Ohio.

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COLUMBUS DIVISION



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Rick is the Mobil marine engineer in Hong Kong. His counterparts work in every major Free World port—more than 400.

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Mobil know-how created the first and most comprehensive service of this kind. It helps assure that goods you send or receive move without delay—that as a passenger you arrive and depart on schedule—that every voyage is a Bon Voyage.

Marine engineering is only one of many

professions represented on the world-wide roster of Mobil personnel. We also employ nuclear physicists, geologists, mathematicians, chemists and engineers of every type, marketing analysts, marketers . . . people prepared to handle more than 100 different positions.

If you qualify, the Mobil companies offer you an opportunity to build a career through training that will utilize your talents to the fullest . . . constantly challenge your ingenuity . . . reward you with a lifetime of richly satisfying work.

* * *

For more information about your opportunity with the world's most experienced oil company, see your College Placement Officer.

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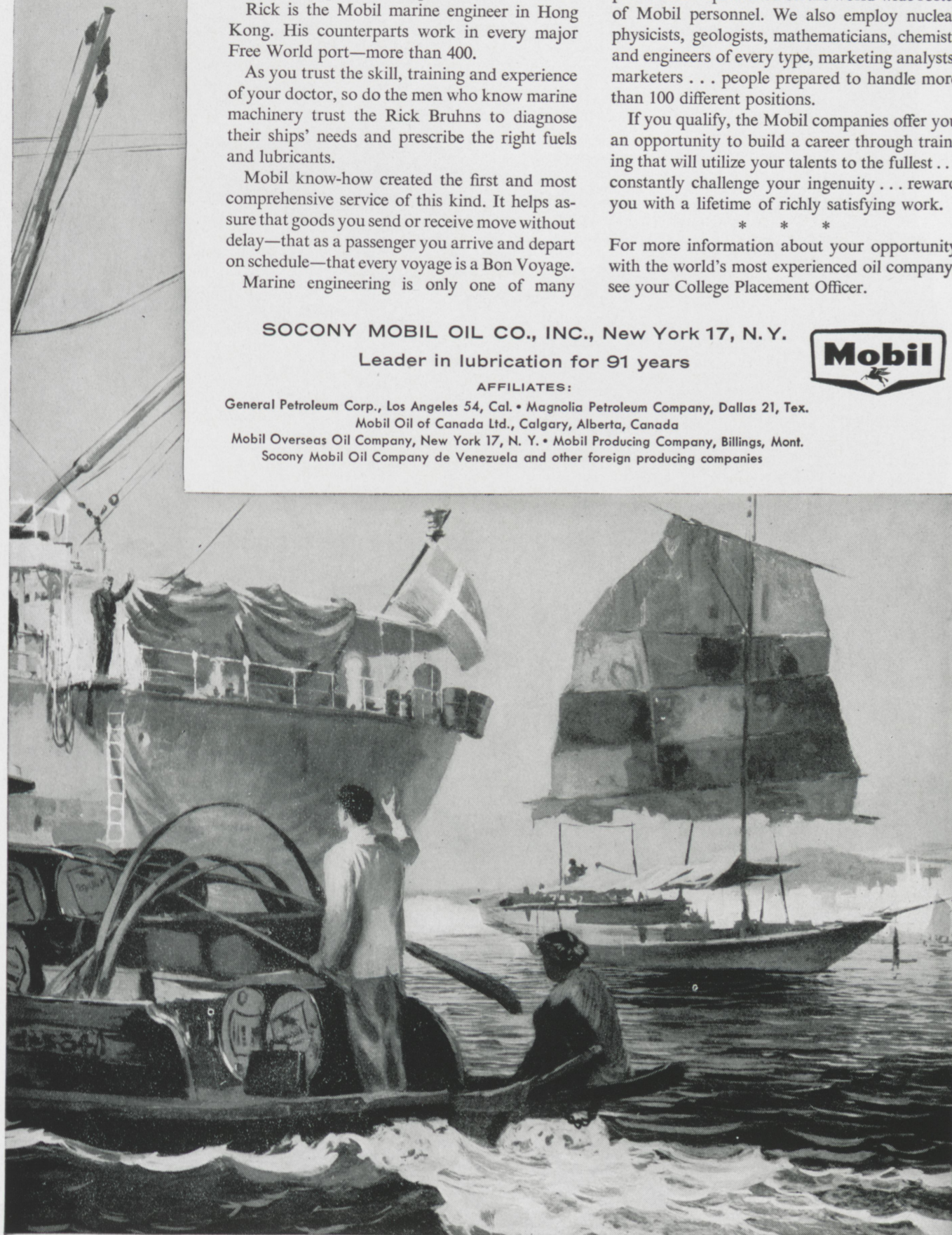
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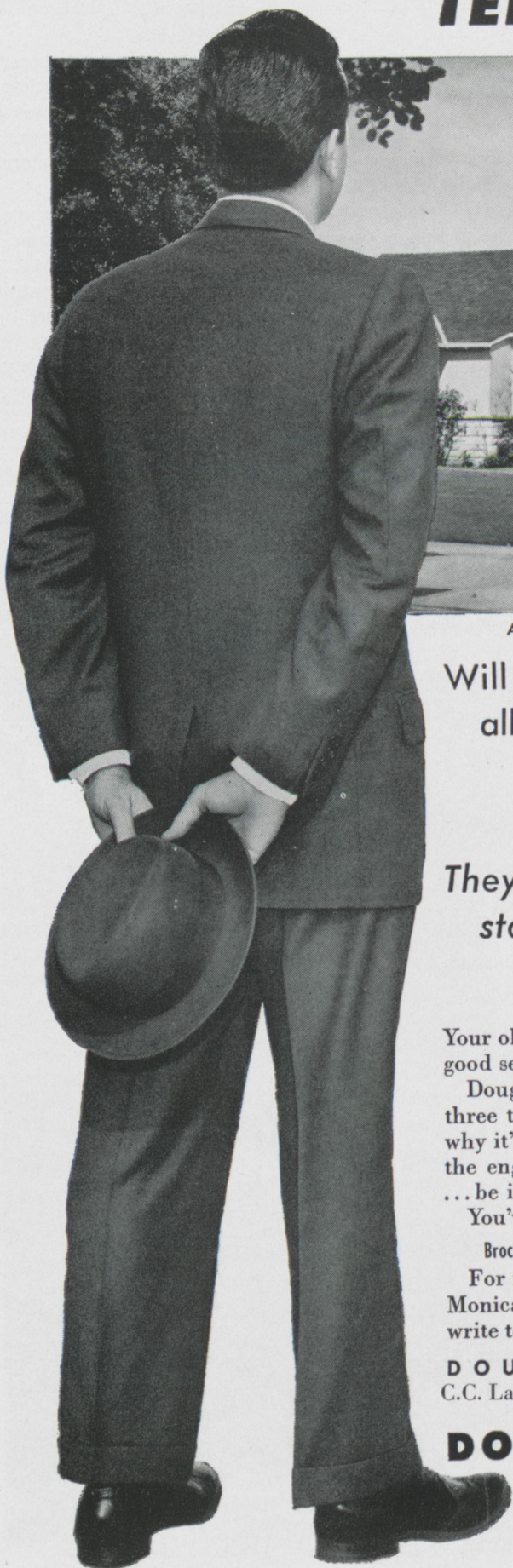
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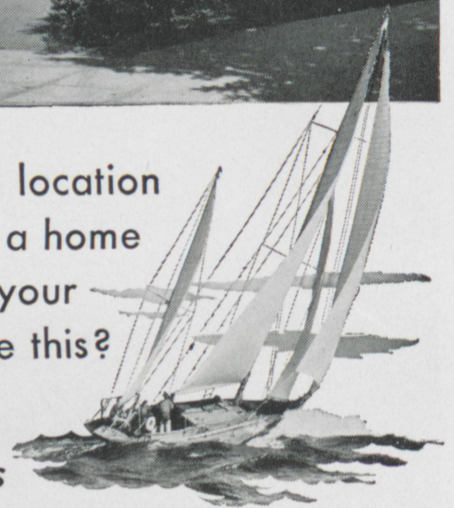
ENGINEERS...LOOK TEN YEARS AHEAD!



A Douglas engineer lives here

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allow you to live in a home
like this...spend your
leisure time like this?

They can...if you
start your Douglas
career now!



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Douglas has the reputation of being an "engineer's outfit," with the three top administrative posts being held by engineers. Maybe that's why it's the biggest, most successful unit in its field. Certainly it offers the engineer unexcelled opportunities in the specialty of *his* choice ...be it related to missiles or commercial or military aircraft.

You've looked around. Now look ahead... and contact Douglas.

Brochures and employment applications are available at your college placement office.

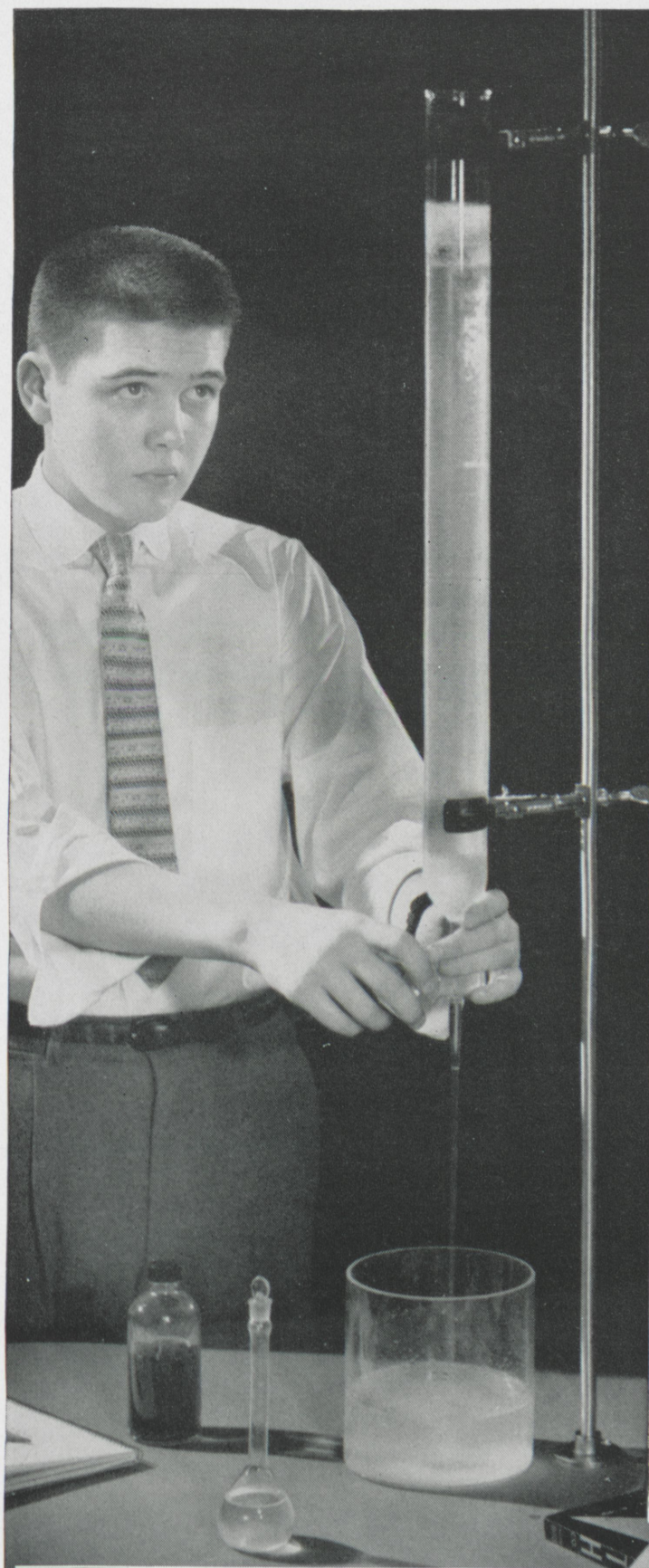
For further information about opportunities with Douglas in Santa Monica, El Segundo and Long Beach, California and Tulsa, Oklahoma, write today to:

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C.C. LaVene, Box 6101-V, 3000 Ocean Park Blvd., Santa Monica, Calif.

DOUGLAS



First in Aviation



How does a chemist happen?

"New ideas," Henry Thoreau wrote, "come into the world . . . with a flash and an explosion and perhaps somebody's castle roof perforated." Many a budding young chemist has introduced his parents to chemistry in similar fashion. But the real making of a chemist takes place in quiet, unspectacular little ways.

There is the challenge of a teacher who asks two new questions for every one he answers.

There is the mental sweat and labor of working out a quantitative analysis—and the glowing pride of being *right*, to the fourth decimal place.

There is the romance of chemistry written wordlessly in the twinkle of an aging professor's eye.

There is memorizing and mixing . . . calculating and titrating and cramming. Hour upon unending hour of them.

But the hours, the days, the years of work and study silently dissolve in that magic moment when a new idea strikes . . . in that moment when all that *has* been done is forgotten, when all that seems important is to learn if this new thing that has never been done, *can* be done.

In that fleeting moment, the student becomes a scientist and begins for the first time to use chemistry to help people gain a little more comfort, a little extra convenience, a little better health.

It is many such moments that make a career in the chemical industry exciting, challenging, and very, very satisfying. Write for a copy of our booklet which shows how you can achieve this type of satisfaction at Koppers. Koppers Company, Inc., Pittsburgh 19, Pennsylvania.



KOPPERS CHEMICALS

March 29, 1957

Mr. Victor E. Schlossberg
Inland Steel Company
Indiana Harbor Works
East Chicago, Indiana

Dear Vic:

Paul Grafe sent me your letter of March 22 concerning the pamphlet sent out to the alumni earlier in the month, "A New Look at the Future". This I was glad to receive.

I wish that you had been able to attend the Chicago Rose Tech Club meeting for problems of expansion outlined in the brochure we discussed at length there, and again at the meeting of the Alumni Association officers on March 23.

We at Rose are in somewhat of a dilemma over expansion. I am sure that many of the alumni feel as you do that Rose would lose much of its power should it grow larger than the present restricted enrollment. Although we here feel that we can increase to about 700-750 students without losing our character as a small and intimate college, we are happy with the enrollment as at present. Future financing for the present size seems bright with adequate promise of growth in income sufficient to bring faculty salaries substantially higher and to attract available faculty. This is, comparatively speaking, a comfortable position to be in.

On the other hand, we are besieged by applicants for entrance in spite of the fact that we are still drawing students from those born during the period of the low birth rate of the thirties. In about three more years the college age population will be greatly increased, perhaps doubled. On top of this, there seems to be no let up in the demand for engineering graduates.

All of this impelled us to make an appraisal of our responsibilities in the matter. We found upon analysis of applicants that we could have increased the freshman class by over 100 highly qualified students last fall. By accepting 250 freshmen we would arrive at an enrollment figure of about 750 students which would result in a minimum instructional cost per student, approximately the unit cost as for our present size, provided we could obtain financing for capital expenditures for physical plant and endowment amounting to about \$4,340,000.00.

Our second study concerned itself with the problem of what such a growth would do to our instructional process. We came up with the conclusion that, if we introduced undergraduate major programs in mathematics and physics along with engineering, we should lose very little, if any, of the things we value in counselling and small group instruction that we value so highly. In fact, should we thus strengthen the sciences, we believe that we could strengthen the engineering program materially.

The next question is, of course, financial and here it is the big one. I do not believe that Rose, as dependent as it is on voluntary annual giving from alumni and industry, should conduct a major fund raising program for over \$4,000,000.00. I am afraid that the risk of drying up our good annual income is too great to try it. However, with expansion of engineering and science as an objective, our preliminary investigation indicates that we may be able to find a number of large gifts that will make any possible additional campaign for capital funds a small one. We are spending the next two months in investigating these possibilities. If discouraged, I, for one, will recommend that we continue on our present program without expansion.

We have made estimates of the future operating income from our present endowment, tuition at \$625.00 (increased \$100.00 beginning next Fall) and normal increases in corporate giving and Alumni Fund receipts. This leaves us shy about \$102,600.00 annually. We estimate that, to provide this additional annual sum, we should have to increase tuition another \$150.00 or obtain additional endowment.

I do not believe it wise to increase tuition for the purpose of carrying extra operating costs due to expansion, therefore, this income should come from increased endowment and approximately \$2,300,000.00 is included in the total amount needed for this purpose.

I agree with you that I do not think the Alumni would be interested in doing more than supporting the program as it exists today and, if I have my way, they will not be asked to contribute more than the normal support to be expected through an annual fund.

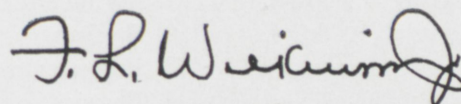
Rose's object in considering expansion to the figure quoted is solely one of discharging a duty to society in helping to take care of those seeking and worthy of an engineering education in an unprecedented large increase in students of college age. It seems to me that Rose graduates should not be asked to take this responsibility but that this a problem with which society as a whole, particularly those large foundations, established for the promotion of the general welfare, should be concerned.

Thanks, Vic, for giving me this opportunity to explain to you the proposed expansion plan for Rose. I am awfully anxious that this plan, which may never be realized, be fully explained to the Alumni. Naturally it cannot be unless interested alumni like you ask questions.

Would you mind if I gave a copy of this letter to the editors of the Quarterly with the request that they publish it? As stated earlier, this is a program that we shall be willing to undertake to meet a social problem that is upon us. Whether it can be accomplished remains solely with a relatively small group whose concern it is that private education is enabled to do a part of the tremendous job that must be done.

With kindest regards and best wishes,

Sincerely yours,



F. L. WILKINSON, JR.
President

THE ENGINEER'S BRIEF CASE

By Robert Hall, soph., ch.e.

Have you ever stopped in the middle of a lab report and your 10th cup of coffee about two A.M. some miserable morning and asked yourself, "Just what good am I going to get out of all this, anyway?" It is almost inconceivable that there lives and breathes a Rose student who has not had at least one such experience. How many times would you have given anything to know what parts of your college career were going to be the most value to you after graduation? To know if a course in numerical analysis, nuclear physics, or economic geography would be useful some time. Of course, it will be twenty or thirty years after graduation before you and you alone can fully evaluate your college career. The closest you can now come to evaluating college is by seeing what present college graduates think of their higher education.

Many opinions and conjectures on the values of a college education have from time to time been voiced among graduates, but few people until now have been able to present any definite facts on the subject. Showing considerable foresight in its educational support program, General Electric Company has just recently completed a survey of 13,500 of its graduate personnel for the purpose of evaluating their college careers. In so far as is known, this survey is the first of its kind, and it is of considerable interest to Rose students because 50.6% of those polled were engineering graduates. Furthermore, the results of the survey were tabulated separately for engineering and non-engineering graduates. Less than 5% of all those polled were women. The

specific purpose of the survey was to determine what college courses and activities had contributed most to the graduates' present positions of responsibility with General Electric. In most respects the results of the survey were about as most Rose students would expect, but there were a few surprises.

The survey was conducted by asking the graduates basically nine questions:

I. What areas of college study have contributed most to your present position of responsibility?

In answer to this question both the engineering and non-engineering graduates emphasized the importance of communication subjects. English ranked by far the most important among non-engineering graduates. The engineering graduates gave mathematics, also a communication subject, a somewhat more important position than English, but considered both to be of the utmost importance. The general opinion of all graduates was that both written and oral communication are of extreme value to a career in industry.

The following table indicates the relative ranking of courses by the graduates.

Ranking of Courses Reported
Most Valuable to Career

Engineering Graduates

1. Mathematics
2. English
3. Engineering
4. Physics
5. Economics
6. Chemistry

Non-Engineering Graduates

1. English
2. Economics
3. General Business

4. Mathematics
5. Psychology
6. Physics

II. What areas of college study have contributed least to your present position of responsibility?

Extreme care must be taken in the interpretation of the replies to this question. It would be easy to assume that the results indicate a lack of value for many college study areas. This is not necessarily the case, for many respondents stated that their answers signified only a lack of direct contribution to their particular job or area of work. Many courses reported as lacking career value were reported by the same people as very valuable to their leisure time activities. However, foreign language, ranked number one by almost all graduates, was considered as nearly useless, providing it is not used directly in a person's job.

The replies from engineering graduates did not vary much from the ranking given in the table below. The reason for engineering standing number three on the list is that many of the graduates reported that they had taken engineering courses in areas other than their personal interest and specialization. Some of them even tended to belittle the whole province of engineering as a career asset since they did not use some courses in their immediate jobs. Such a reaction might be expected, and is no great cause for alarm. This reply also shows the importance of getting a general education in engineering before one tries to do too much specializing.

Ranking of Course Reported
Least Valuable to Career

Engineering Graduates

1. Foreign Language
2. History
3. Engineering
4. Economics
5. Government
6. Chemistry
7. Literature

Mathematics
(tie)

8. Miscellaneous Sciences

Non-Engineering Graduates

1. Foreign Language
2. Miscellaneous Sciences,
(Botany, Zoology, Geology,
etc.)
3. History
4. General Business
5. Accounting
6. Economics
7. Mathematics
Physics
Government
(tie)

III. What areas of college study have contributed most to your use of leisure time.

In corporate personnel practice there is an increasing emphasis upon the importance of employees' leisure time activities, because it is felt that an employee whose outside activities are satisfying and rewarding is a happier and more valuable employee.

Surprisingly enough, English Literature was the subject reported most valuable to leisure activities by engineering graduates. And who is it that says the only culture engineers get is from reading who-dunits? It is also interesting to note that literature was frequently reported among the least valuable subjects to the engineering graduate's career. Most of the respondents stated that English Literature helped them to relax and develop non-business thinking. All indications showed that the type and quality of personal leisure reading were directly connected with literature courses in college. Also, engineers are not supposed to be much on history as a rule, but look where history is on the list below.

Ranking of Courses Reported Most Valuable for Leisure Time Activities

Engineering Graduates

1. English Literature
2. Engineering
3. History
4. Economics
5. Physics
6. Math and Philosophy
(tie)

Non-Engineering Graduates

1. General Business
2. English Literature
3. History
4. Science and Engineering
(tie)
5. Math and General
Humanities
(tie)
6. Physics and Philosophy
(tie)

IV. What specific areas of study or courses would you recommend most highly to a high-school graduate entering college who aspires to a position of responsibility?

All the graduates agreed on four basic fields of study which should be emphasized:

1. Science and Technical
2. Humanities
3. Social Sciences
4. Business

Nearly all the graduates emphasized the importance of English and communications subjects.

Many comments pointed out the importance of a balanced program which should be broad, and should teach mental discipline and the ability to think. Engineering graduates thought that without undue specialization students "should take all available engineering courses which might be scheduled". Specialization courses, they held, should be reserved for graduate work or for special educational courses offered by the company with which the student accepts employment.

V. Do College Extra-Curricular Activities Aid an Individual in Developing Himself for a Career?

Considering only the replies of the engineering graduates, 94% of the respondents reported participation in extra-curricular activities, and 71% of these felt that such activities had definitely aided their careers. They seemed a little vague, however, in stating just what activi-

ties were or were not of real benefit in building a career in industry. Participation in professional organizations like the A.S.C.E. and so on was considered important by most of the engineering graduates. Student offices and work on college publications also received mention. Fraternity offices were cited as being particularly good business experience. A large per cent of the graduates had participated in athletics, but few mentioned this experience as being valuable to a career. This, however, is no reason to state that athletics should be relegated to a dusty shelf in the college program. Since the values gained from athletics can only be applied indirectly to the making of a career, we would not expect too much mention of athletics. It is well to keep in mind that student organizations and activities may vary from campus to campus, which fact makes this question difficult to answer with any degree of exactness.

VI. Are college values more lasting in influence because of subject matter or because of teaching personality?

Liberal-arts answers to this did not indicate very much either way. 49% answered teaching personalities, and 51% said subject matter. Engineering graduates were a little more decided in favor of subject matter. 49% said subject matter was more important, 45% said teaching personalities, and 6% could not decide which. No very definite policy can be drawn from the answers to this question, and if these replies do indicate anything definite, it is only that both subject matter and teaching personalities are important.

VII. What types of financial support are recommended where family resources are limited?

In answering this question the graduates showed strong feeling on two points. First, they believed strongly in individual initiative and personal effort in financing education. Second, they felt that a student should continue his college education "by any means possible", in

(Continued on page 43)

EARTH TAKES INVENTORY

By F. R. Denton, jr., e.e.

In today's world of H-bombs and peaceful coexistence a fresh breeze is supplied by the scientific world. Scientists cooperating on an international basis for a period of 18 months are going to make a gigantic push to try and find out just what makes this old world tick. This great scientific collaboration is going to cost the world's taxpayers some \$200,000,000.

The official name of this effort is the International Geophysical Year. It begins in July of 1957 and extends through all of 1958. Some 50 member nations are going to be active participants. Russia and the U.S.A. are contributing approximately equal portions of the money and talent necessary to carry out the project. The other member nations are backing IGY on the basis of their population and ability.

What is IGY? What's it for? These and other questions are perhaps best answered by first defining Geophysics.

The idea of international scientific cooperation is in no way new. In 1882 there was an International Polar Year. This effort, although extremely limited by today's standards, uncovered information that enabled Marconi to establish wireless contact across the Atlantic. A second Polar Year was held in 1933. This resulted principally in studies of the ionosphere and radio propagation over great distances. Unlike the present effort, these two early IPY's were limited to the north pole. IGY will cover the entire earth. In Antarctica alone, there are being built over 45 stations to observe weather and cosmic radiation.

The United States' assigned portion of the work is being directed by the U.S. National Committee for the Geophysical Year. The men participating specialize in, to name a

few, meteorology, glaciology, seismology, geomagnetism, and ionospheric physics. The following phenomena are the major ones to be studied.

Solar Observation

The sun, as we know it, is very similar to millions of other stars. However, we don't really know much about it. We know how big it is, how hot it is and how far away it is, but just what effects does it have on the earth? Solar activity seems to follow an eleven year cycle. The 18 months period of IGY was chosen on the basis that the sun should be going through one of its more active stages at this time, thus making observation easier. The complexity of the data to be taken will require simultaneous recording of information from widely separated points throughout the world. The coordination of the instruments will require a world-wide communication network.

Weather Prediction

The weatherman of today's newspapers is notoriously inaccurate when it comes to long range predictions. IGY will attempt to improve man's meager knowledge concerning weather and what causes it. One baffling phenomenon that could cause weather are air currents traveling north and south from pole to pole. Stations at both poles along with balloons and rockets will provide much needed information about these air currents.

Auroras

The auroras (northern and southern lights) are caused by the bombardment of the earth of ionic particles from the sun. The tracing of the paths of these particles through the ionosphere could lead to an improved understanding of the effect of sun spots on radio communication.

Man has spent millions of dollars to build machines that will accelerate particles for research. Cosmic radiation provides a continuous supply of high energy particles that have velocities far beyond those produced by our most powerful accelerators. If, someday, this energy could be harnessed and used to do useful work an unlimited source of free energy would be at man's disposal.

Magnetic Fields

The magnetic field of the earth varies continuously. Known causes of this variation are changes in the earth's crust, upheaval and the gradual grinding down of mountains. Frequently the earth's field will change very suddenly and very drastically. Man has no definite theories explaining these changes. Perhaps it is caused by some flow of molten metal deep in the earth's interior, some kind of great electrical current surrounding the earth in free space. Sudden passage of charged particles through this current could cause changes in the magnetic field. A few answers to this riddle could effect changes in our communication, knowledge of cosmic radiation, and mineral exploration.

Earthquakes

Since earliest time man has been bothered by earthquakes. IGY will try to obtain information leading to the early detection of earthquakes, particularly in the unstable portion of the earth's surface. There will also be an attempted correlation between earthquakes and meteorological events. Much of the investigation will be conducted in Antarctica using seismographic techniques developed by geologists while searching for oil.

(Continued on page 45)

CAMPUS SURVEY

By Don Weidner, jr., e.e.

Oscar C. Schmidt Lecture

The annual Oscar C. Schmidt memorial lecture was held in the auditorium on Thursday, April 11. This year's speaker was Mr. Glenn W. Thompson, President of Arvin Industries in Columbus, Indiana. Mr. Thompson was introduced by President Wilkinson who gave highlights from his career in business and in community, state, and national service.

Mr. Thompson was an effective and inspiring speaker and mixed humor liberally in his address. Speaking on our present economic system, he mentioned the opportunities for engineers, how to take full advantage of these opportunities, what industry expects from graduate engineers, and other interesting points.



In a special convocation on Friday, April 26, N. W. Dougherty, Dean Emeritus of the University of Tennessee, gave a very optimistic and interesting speech on professional ethics and the future outlook of engineering.

The enthusiastic applause indicated that Mr. Thompson's address was enjoyed by all present and that he will be welcomed back to the Rose campus anytime.

AIEE

This seems to be the busy season of the year for AIEE activities. On April 4, the annual paper contest was held with Purdue University at Lafayette. Rose was well represented with entries and we came out pretty well in the prize paper division. Although a Purdue man took the top spot, Frank Denton Jr. won second place and third place went to Bill Waggener. The group went to Purdue early in the afternoon and toured the School of Electrical Engineering.

Prof. Strum, Frank Denton and Bill Waggener attended the AIEE conference at Iowa University over the weekend of April 14. (From all reports it was quite an event). Denton served as chairman of the paper contest and Bill presented his paper to the conference.

Parent's Day

Parent's Day will be held on the Rose campus May 11 this year. Plans are being made to welcome and entertain parents of students and give them opportunity to tour the campus, meet the faculty, etc. Specific details will be posted soon giving the schedule for the day. It is hoped that a large number of parents will plan to attend.

Campus Club

At the final meeting of the present Campus Club Executive Council on April 15, President Tom Clark was presented with a gavel by the members in recognition of his service during the past year.

In reviewing the year's activities, Tom thanked the council members for their efforts and expressed hope that the new council and officers will continue to work toward activities and improvements for campus residents.

Nominations have been made for new officers and elections will be forthcoming.

Gala Performance

Gala Performance, a musical production featuring ballet, dance and vocal numbers was presented in the Rose Auditorium April 7, 1957. Students obtained free tickets in the office and the remainder of the seats were sold to faculty members and townspeople. The auditorium was filled to its capacity and the performance was highly enjoyed.

Junior Prom

The junior class presented "Rhapsody in Rome" Saturday night, April 6, from 10 to 1 in the Mayflower Room at the Terre Haute House. Programs and decorations carrying out the theme, complete with white columns and a miniature fountain added to the atmosphere. Dancing was enjoyed to the music of George Friepe and his band from Indianapolis.

COLOR TELLS ALL

By Toby Eubank, jr., ch.e.

The almost frightening name, chromatography, is used to describe a method for separating chemical compounds. In most cases the method is purely physical and may be explained in the following manner.

A vertical tube, such as a buret, is packed with a powdery solid, called the absorbent. Common absorbents include aluminum oxide, limestone, sugar, and charcoal. Now suppose a water solution of ferric, cupric, and cobalt nitrates is poured into the top of the tube and slowly absorbed by the absorbent.

During absorption two main forces act on each molecule in the solution; they are gravity and the attraction force between the molecule and the absorbent. This latter force may also be thought of as the resistance offered by the absorbent. Fortunately, this attraction or resistance varies for different compounds, causing, in this case, each of the three nitrates to move down the tube at a different velocity. This produces separation, and if the compounds are colored, bands may be seen at different points down the tube. Here a brown band of a slow-moving ferric nitrate forms at the top of the column, followed by a blue, cupric band and a pink, cobalt band, in that downward order.

To increase the difference between the velocities and bring about better separation, the addition of the solution to the tube is usually followed by a solvent, which carries different compounds down the column with varying velocities. The effect of a

solvent and absorbent may be considered similar except that they act in opposite manners. A solvent and an absorbent may work against or with each other in promoting greater separation. The selection of the solvent and absorbent for a given solution is of primary importance and usually can be done only after extensive testing.

Two methods have been used to recover the separated compounds from the column. One is to keep adding solvent until each band (one at a time) reaches the bottom and

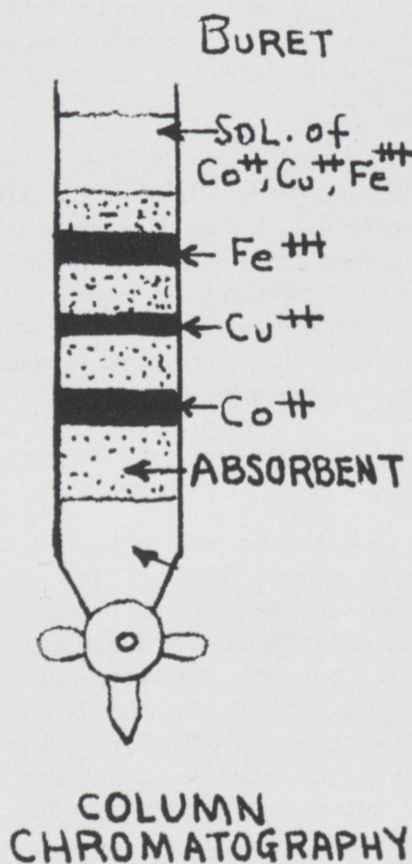
is collected as a water solution. For this example, the cobalt band would be collected first, followed by pure solvent, the cupric band, pure solvent, and the ferric band, in that order. The second recovery method consists of pushing the absorbent out of the tube with a dowel rod, separating each band from the rest of the absorbent, and extracting the desired compound out of its band. As the reader may have noticed, this last method is rather difficult to apply when using a buret.

A special problem arises when the compounds to be separated are colorless. The colorless bands formed in the tube are often detected by their fluorescence to ultra-violet light. Radio-active elements have also been incorporated in chemical compounds, thereby labeling them.

There are a number of forms of chromatography; the method described above is known as column chromatography. While this is the oldest type, paper chromatography has become at least as popular in recent years.

Paper Chromatography

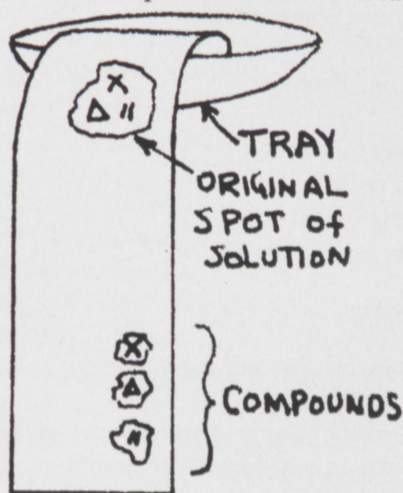
The main difference between paper and column chromatography lies in the use of filter paper as the absorbent. A long, rectangular paper is draped over a trough as shown in the diagram. By using a capillary tube, a solution of the compounds to be separated may be applied at a point near the top of the paper. This forms a spot which is usually 1 cm. in diameter. Now the solvent may



be placed in the trough and allowed to pass down the paper, separating the solution spot into individual spots, one for each compound. These spots may be compared to the bands formed during column chromatography. After drying, the paper is usually sprayed with something that will react with the separated compounds to give colored spots.

In paper chromatography, as for other types, the solvent front moves faster than any of the individual compounds. On this basis the "RF" value of a given compound for a given solvent equals the distance moved by the compound divided by the distance moved by the solvent. All measurements of this type are made from the original spot of solution, the starting point.

Sometimes one solvent will only separate some of the compounds in a solution. However, if a second solvent is known that will separate the compounds left together by the first solvent, then two-dimensional, paper chromatography may be employed. For example, a spot of solution containing four compounds may be placed at position 1 on the diagram. Now if solvent A is passed down the paper, the solution becomes divided into a solution at 2 and one at 3. Each of these new solutions contains two compounds. Then solvent B may be passed to the left on the paper, separating solution 2 into compounds 4 and 5, and 3 into compounds 6 and 7. Wide



**PAPER
CHROMATOGRAPHY**

applications have been found for two-dimensional, paper chromatography in the separation of amino acids and sugars.

The separation of amino acids is of such importance that it warrants further discussion. Amino acids are the building blocks for proteins, which the body mainly consists of. A protein may be analysed by hydrolyzing it to its amino acids. The amino acids are then separated by chromatography and identified. In this way it can be determined whether a particular protein or food contains the certain amino acids necessary to the body.

Ion-Exchange Chromatography

This type of chromatography is of comparatively recent origin. Here the set-up compares with column chromatography except either an acidic or basic, ion-exchange resin takes the place of the absorbent in the column. In general, acidic resins are used to separate cations; basic resins are used for anions. Let us see why this is so.

Unlike the column and paper chromatography discussed, chemical reactions take place during separation. If a solution of chloride and acetate anions is acidified, the solution may be considered a mixture of hydrochloric and acetic acids. When this solution passes down the column, the anions are absorbed by the basic resin. However, since hydrochloric is a stronger acid than acetic, it will depress the ionization of the weaker acid and hydrochloric will be absorbed to a greater extent than acetic acid. Hence, the chloride ion moves down the column slower than does the acetate ion. The separation of a cation of a strong base from one of a weak base, by way of an acidic resin, may be explained identically. Two factors which change the speed of an ion are its charge and radius as a hydrated ion. Greater charge, whether positive or negative, and smaller radius tends to decrease the rate.

During the war, the Atomic Energy Commission found it necessary to separate mixtures of the rare earth metals and fission products. As in the case of amino acids, the only

suitable method found was chromatography. The rare earth cations were separated on acidic resins by ion-exchange.

Gas Chromatography

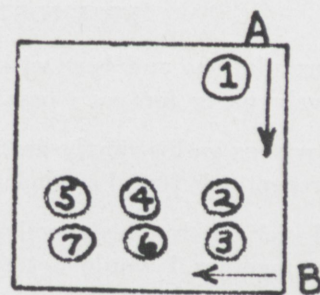
Another new and interesting branch is gas chromatography, where liquids are replaced by gases in a system similar to that used for column work. Gases which are nearly alike, such as 2,3-dimethylhexane and 2,5-dimethylhexane, may be separated.

The mixed bases are first injected into a stream of nitrogen gas, the "solvent". Then the stream passes thru the packed column where the gases are separated. The presence of a gas is detected by thermal conductivity. It should be mentioned that activated charcoal makes a good absorbent in the separation of most gases.

Analysis

Chemical analyses are run to determine *what* and *how much* of each ion or compound is contained in a mixture. Chromatographic methods are especially helpful for finding *what* a mixture contains. For example, instead of testing separately for each ion, a solution of the unknown sample is passed down a column or a paper, and the separated ions are detected by their colored bands or spots. Besides saving time and work, chromatographic methods are usually more

(Continued on page 42)



**TWO-DIMENSIONAL
PAPER
CHROMATOGRAPHY**

The philosophies herein expressed are done in poetry—a rare form of expression, indeed, for the precise nature of the engineer. On this note, it is with great pleasure that the TECHNIC presents these poems of John H. King, sr., e.e.

Editor.

ACCOLADE

To some, a tomb may just mean death
Those rocks that mark the crest
But to a man who's lived his life
'Tis but a place for rest
"Well earned young man"

And on these stones, last steps to Christ
Inscriptions tell the tale
Here lies a man who knew his worth
And used it to avail
"Well done young man"

And should the body be a boy
Whose life knew no great span
If he had found his heart could laugh
Then this boy died a man
"Well done young man"

For it is not the gold attained
That during life seemed great
No—all the gold that's in the fort
Will not prolong your fate

So since that time is bound to come
When darkness will succeed
Live life on earth the best you can
In every thought and deed

Then on the day you meet your Judge
Those left on earth will say
"Though riches weren't bestowed on him
He earned the right to walk with God
The one price he could pay"
"Well earned young man."

FRIENDS??

Congratulations and best wishes for his future
A lovely party for your new born son
Best wishes on his timely graduation
The reception's fine, I'm glad that I could come

Good luck on this, his excellent promotion
A get together I would not have missed

He what? He died! My sympathies are offered
Another party, indeed we do insist

My friends? Not quite, just casual acquaintance
Whose parasitic ways seem to prevail

For my friends fill the void between occasions
Their generosity is not for sale.

MATTER OF CONVENTION

You say two and two is four
I say its five
You say that rocks are hard
I say they're soft
You say the sky is blue
I say its orange with yellow polka dots
I say that water's dry
And that mountains are just holes in the ground
You say time marches on
I say it stops now and then
Scratches its head
Then proceeds in a bumpy fashion
Are you happy? Are you content? Good—so am I.

RECALL

A little work and not much play
No smile, a frown, a sigh
A little jealousy each day
Of this you can't deny
Some pride cut down, some ego hurt
Some names come out in vain
A small amount of heartache
And then a dab of pain
And then that day you've feared is here
The day that brings your death
Won't someone please just shed one tear
You're doomed without a breath

Is this the tragic way of life
All bitter—no reprieve
Composed of ugliness and strife
Of this I can't conceive
Just stop and think—Let's try some prayer
And then let's look above
The Almighty's face holds no despair
For you He just has love
And in God's face you'll see a smile
And then you'll know you're safe
For God has played a game with you
A game to test your faith.

DEFEAT

A hungry wind bites deeply on the famined man
The desert isle, a tragedy to thirst
But more intense is pain which comes from hearts of sand
Whose shifting amour hurts much more the worst

A misplaced coin may test a patience, thought so strong
The life cut short brings tears and grievance fast
But loss of faith in one for whom you've loved so long
This surely is the limit, first and last.



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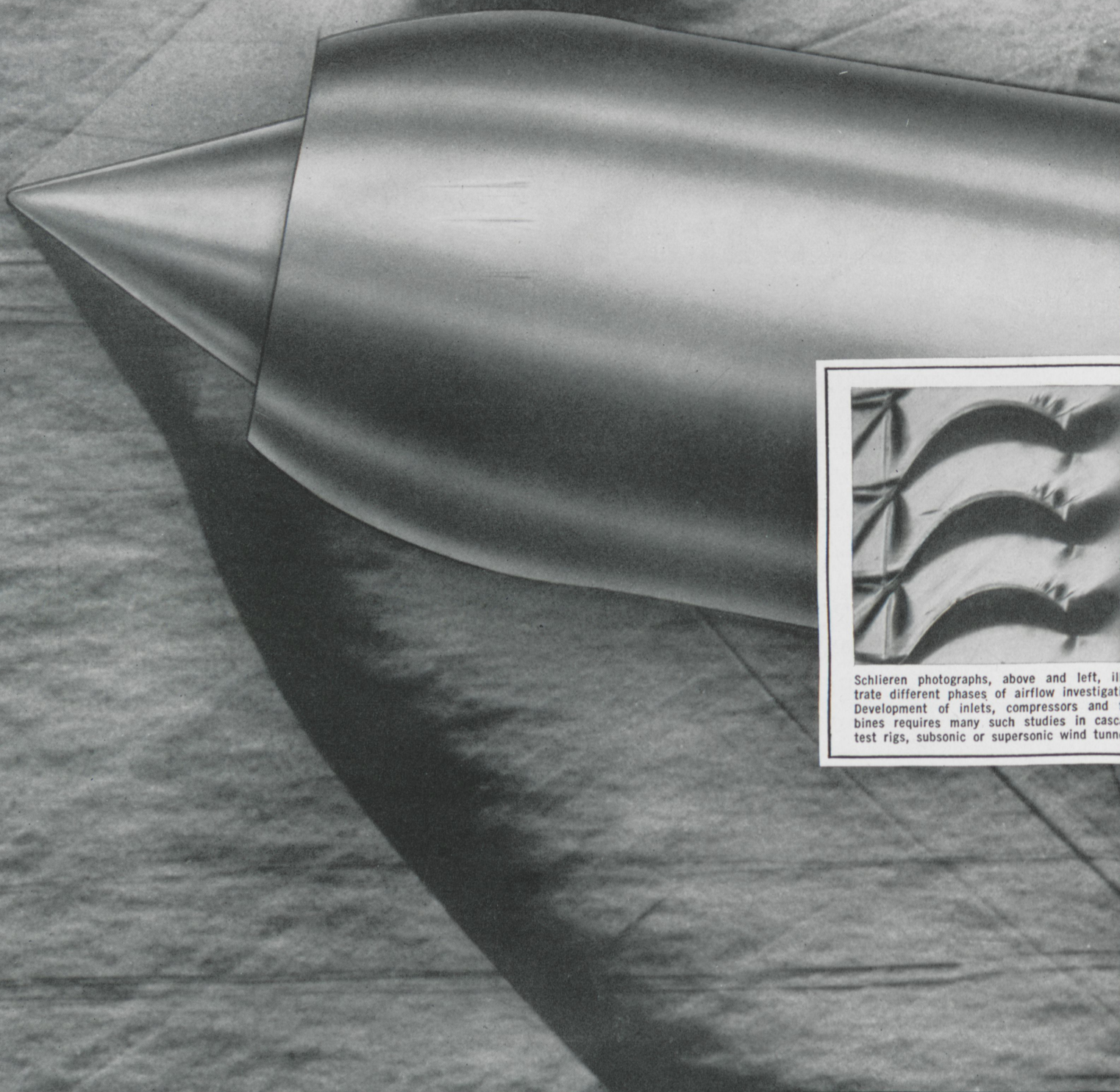
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What's doing.



Schlieren photographs, above and left, illustrate different phases of airflow investigation. Development of inlets, compressors and turbines requires many such studies in cascade test rigs, subsonic or supersonic wind tunnels.

at Pratt & Whitney Aircraft in the field of Aerodynamics

Although each successive chapter in the history of aircraft engines has assigned new and greater importance to the problems of aerodynamics, perhaps the most significant developments came with the dawn of the jet age. Today, aerodynamics is one of the primary factors influencing design and performance of an aircraft powerplant. It follows, then, that Pratt & Whitney Aircraft — world's foremost designer and builder of aircraft engines — is as active in the broad field of aerodynamics as any such company could be.

Although the work is demanding, by its very nature it offers virtually unlimited opportunity for the aerodynamicist at P & W A. He deals with airflow conditions in the en-

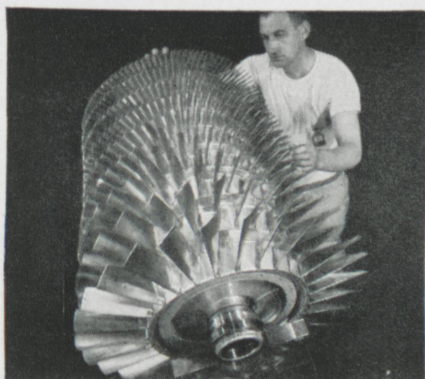
gine inlet, compressor, burner, turbine and afterburner. From both the theoretical and applied viewpoints, he is engrossed in the problems of perfect, viscous and compressible flow. Problems concerning boundary layers, diffusion, transonic flow, shock waves, jet and wake phenomena, airfoil theory, flutter and stall propagation — all must be attacked through profound theoretical and detailed experimental processes. Adding further to the challenge and complexity of these assignments at P & W A is this fact: the engines developed must ultimately perform in varieties of aircraft ranging from supersonic fighters to intercontinental bombers and transports, functioning throughout a wide range of operational conditions for each type.

Moreover, since every aircraft is literally designed around a powerplant, the aerodynamicist must continually project his thinking in such a way as to anticipate the timely application of tomorrow's engines to tomorrow's airframes. At his service are one of industry's foremost computing laboratories and the finest experimental facilities.

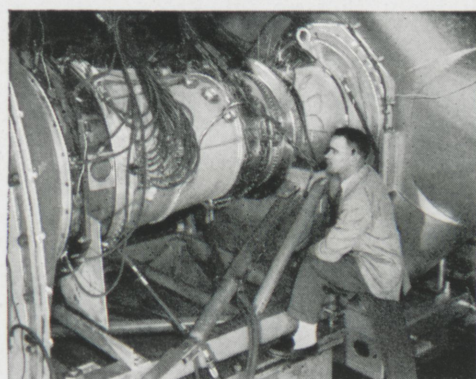
Aerodynamics, of course, is only one part of a broadly diversified engineering program at Pratt & Whitney Aircraft. That program — with other far-reaching activities in the fields of instrumentation, combustion, materials problems and mechanical design — spells out a gratifying future for many of today's engineering students.



Modern electronic computers accelerate both the analysis and the solution of aerodynamic problems. Some of these problems include studies of airplane performance which permit evaluation of engine-to-airframe applications.



Design of a multi-stage, axial-flow compressor involves some of the most complex problems in the entire field of aerodynamics. The work of aerodynamicists ultimately determines those aspects of blade and total rotor design that are crucial.



Mounting a compressor in a special high-altitude test chamber in P & W A's Willgoos Turbine Laboratory permits study of a variety of performance problems that may be encountered during later development stages.



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SOMETHING TO THINK ABOUT

By Norman Huntley, fr.

Then there are those who think that physics and engineering are synonymous. The retort:

Oh, dammit! Engineering

Isn't physics, is that plain?

—Arthur Roberts

Upon this viewpoint hangs a tale, paradoxical though it may be. Let me elucidate by first presenting contemporary definitions of both engineering and physics. "Engineering is the art and science by which the properties of matter and energy are made useful to man in structures, machines, and products." On the other hand, according to a physicist, the activity called physics is research, and is conducted solely for the purpose of furthering man's knowledge by quantitative means.

"Fine!", you may say, "We understand one another, but of what interest is that to me?" To which I may reply, "Of no interest, unless you happen to be an engineering student, alumnus, educator, or, in fact, any intellectually mature individual concerned with the problems of contemporary times." Why? For the simple reason that one can no longer completely departmentalize the fields of engineering and physics; in effect, the viewpoint expressed in the opening statement must now be completely re-evaluated. Physics can be engineering and engineering can be physics at once when in the hands of a new operator in both fields—the engineering physicist.

It was not very long ago that the profession of engineering was solidly founded upon the concept of a technical art. The chemical engineer, for one, was considered by some scientists as a virtual plumber, nothing more. Despite the thinking

of a few, such a condition is fast fading away; every field of engineering is moving closer to a technological state based squarely upon the physical sciences. Some educators attribute this movement to the "shotgun wedding" of scientists and engineers by the wartime demands upon our national technology, especially in the electronic, aeronautical, and chemical fields. However, it is as much attributable, if not more so, to the fact that the discoveries of pure physics research are physical realities, not fantasies, and are endowed by this reality with a certain usefulness for mankind. As a result, the once esoteric fields of quantum mechanics, relativity, radiation theory, and nuclear transformation have been resoundingly dropped into the lap of the electrical, mechanical, civil, and chemical engineer.

Mr. Earl P. Stevenson, Chairman of the Board of Arthur D. Little Inc., cites an illuminating case of this in a recent article. Theirs was the seemingly classical engineering assignment of developing the cryostat. However, in order to complete the task it became necessary to first produce the low-temperature tools required to do the job, an unforeseen project which found the engineers actually conducting basic physics research in low-temperature phenomena due to the incomplete supply of data in this field. Engineers found themselves unravelling problems in quantum mechanics and compiling research data on such subjects as thermal conductivity of superconductors in and out of magnetic fields. Mr. Stevenson also speaks of engineers conducting fundamental research in atmospheric physics, radia-

tion biology, radio-astronomy, small-particle physics, and nuclear technology. Significantly, this state of affairs is not the exception, but is fast becoming the rule for research and development engineers.

No more can engineering "stand aside and look upon this modern atomic age as a product of Modern Physics and modern physicists alone, refraining from an active association with that field of discipline." Science can only move in one direction, forward, and as it moves, so must move engineering.

To compensate for this influx of modern physical methodology into the engineering professions, many schools have expanded their engineering physics requirements to a total of eight semester hours of work to which a greater or lesser degree has been apportioned to modern physics. Princeton University, in fact, details 30% of their engineering physics course to the study of atomic, nuclear, solid-state, and other areas of modern physics. At present, this may be sufficient training in the subject for the bulk of our prospective engineers, but it should not be construed as a cure-all for the real issue at stake which we shall presently take up. However, Princeton's Dean Joseph C. Elgin feels that it should be the minimum requirement in order that the future problems soon to face these engineers in radioactivity, radioactive-induced material failures, the physics of the solid-state, and atomic power, to name a few, will be understood by them.

Unfortunately, however, there appears to be a far greater issue to be faced than the mere inclusion of Modern Physics within an existing

engineering curriculum. That issue deals with the failure of many engineering colleges to perform their educational functions to the limit. The nature of the problem is such that the best interests of 1. Industry, and 2. Students are not met. Let us consider first the case of the students. Richard B. Adler of the Electrical Engineering Dept., MIT, has this to say.

In this connection I once noted with alarm the fact that a very large percentage of the really significant recent applications of science were not only conceived, but also quite extensively developed for practical use, by men who were trained as scientists or applied mathematicians, rather than as engineers.

He cites in particular the idea of radar, the magnetron, much of micro-wave circuitry, Maser principle, traveling wave amplifier, theory of information, theory of automatic control, nuclear pile, and others. The point to be made is that the men who conceived these real technological advances were of sufficient talent to choose either science or engineering as their profession, and chose science instead, only to make their contribution in fields which are fundamentally engineering fields. Significantly, they developed into applied physicists, or, if you will, engineering physicists. Why did they not choose engineering from the start?

Professor Adler implies the answer. "Should we not design our undergraduate engineering education in a way which will make it appeal to these men of such great technical talent?"

What of industry, the ultimate consumer of engineering talent as well as the investor in the same, is it being adequately served in the light of future needs as well as the present one? Dr. James R. Killian, President of MIT, has a few pertinent remarks. "So far our chief reliance has been on an undergraduate professional preparation—a system

which has not universally risen above the training of technicians. . . Many industrial companies have been ahead of the colleges in recognizing the need for engineers of higher attainments." With this need in mind, those industries have instituted advanced training programs for their young engineers of known ability to provide what the colleges they help to support did not provide—the advanced degree of learning necessary to fit their engineers for research and development positions. "To the extent that industry has had to do this because of the inadequacy of the preparation of their engineers in the colleges, they have had to make up for the defaults of education." Since education is the prime mission of the engineering college, it is only fitting that they provide that level of learning that industry requires.

Today research is a glamour word in the American industrial lexicon. Of our national research expenditures of five billion or so, industry is responsible for two-thirds and industry's investment is to pay off, as indeed industrial research has in the past, there must be a steady flow of first-rate minds into our industrial laboratories.

Indeed, Mr. Stevenson, speaking for industry, affirms this view when he declares that the growing concern of engineers with research problems demands that they acquire experience in basic as well as applied research. He feels that although industry now needs engineers, it is deeply concerned with the shortage of that unique type of man classified as the engineering-scientist.

If the need is great in industry, the need is greater still for this new breed of engineer to maintain our technological supremacy on an international scale. What we cannot match in quantity, we must match, and if possible, surpass in quality. What is needed is a man, well-educated, well-trained, with a love for creative work. This calls for a new type of man than has heretofore

come out of our engineering colleges. To produce this man calls for a new type of educational program—Engineering Physics.

The objective of an Engineering Physics curriculum:

(to) provide a training which thoroughly integrates the basic knowledge and analytical background of the physicist and to a certain extent the applied Mathematician and chemist with an adequate knowledge of the physical constitution and properties of materials and the technological practices and methods of engineering.

In seeking the best means of obtaining this objective, it appears that two directions of not totally unrelated movement have arisen; the common denominator of the two being the basic philosophy of the program which is "... designed to include a large content of basic science and mathematics and less emphasis on contemporary practice. We need more programs that are less vocationalized at the undergraduate level and fundamental enough in their basic science and humanities to educate a new breed of engineer more adaptable to our rapidly advancing technology."

The most common type of educational program meeting this need is found in the four or five year program normally called either Engineering Physics or Engineering Science. Minor variations of its basic theme are at present found in Princeton, Cornell, Penn State, Case Institute, Ohio State, Michigan, Purdue, Illinois, and Northwestern, to name a few. The second basic program is found predominantly among the eastern schools, Dartmouth being an example. Here, the entire engineering curriculum is based upon a four year program of Engineering Science, with a fifth year required to obtain a B.S. degree in Civil, Electrical, or Mechanical Engineering.

In principle, according to Dean Elgin, Princeton's emphasis on a
(Continued on page 44)

Fraternity Notes

SIGMA NU

Beta Upsilon elected its officers for the 1957-58 term at the second meeting in April. The newly elected officers are: Eminent Commander, Tom Clark; Lieutenant Commander, Dan Maffucci; Recorder, Gil Kovener; Treasurer, Lou LaPosa; Ass't Treasurer, Jerry Parr; Reporter, Jack Gaughan; Chaplain, Bob Jackson; Sentinel, Russ Heelan; Marshall, Jim Neal; Alumni Contact Officer, Dick Light; and Historian, Don Slack. Also at a recent meeting Bob Crisp was elected house manager to serve until September. Congratulations fellows and the best of luck in your new offices.

After having gotten the inside of the house in good shape over the past three years, some much needed work has finally been started on the outside. About ten layers of paint have been removed with the aid of blowtorches and we hope to have the front of the house painted by summer vacation—if it ever stops raining.

A mixer built around the theme "April in Paris" was held at the house April 26, with the Delta Gammas from I.S.T.C.

The word from the bird still has it that R.A.L. will attend the I-F dance with a date, however, as the dance draws near nobody is holding his breath.

Dan Cupid has been going hog wild among the brothers and no less than five weddings are planned for the summer or early fall. Those taking the final step and their future Eminent Commanders are: Dave Moeller and Miss Pat Rimshas of Clinton, Indiana; Lou LaPosa and Miss Barbara Kovach of Hammond,

Indiana; George South and Miss Cora Archung of Brooklyn, New York; Don Slack and Miss Marcia Huebschman of Troy, Indiana; and Jim Neal and Miss Mary Ellen Boyland of Lebanon, Indiana. The entire chapter wishes the brothers and their brides the best of success and happiness.

Jack Gaughan

THETA XI

It seems another proud TX'er has fallen before the onslaught of the wiles of womanhood. Brother Ernie Boodt went and got hitched over Easter vacation. I guess the charms of Miss Ione Benham were just too much for the impatient dog. And I hear Miss Bonnie Zelle has similar plans for Brother Jack Wilcox immediately after graduation.

What's this rumor going around about Brother Kunz wearing out some shoe leather? I never knew you liked midnight walks, Bill!

The actives triumphed over the pledges for the second time this year. I guess we actives will have to give the pledges some lessons on softball in addition to their other studies.

*The TX Tigers lost to Lambda Chi Alpha 7 to 10 in our first interfraternity softball game. We are hoping for better weather for the rest of the season.

Congratulations are in order to Brothers Hitchcock, Boyer, Denny, Heffner, Kleptz, and Pierson who were recently initiated into Theta Xi.

There was an informal get-together at the House Saturday, April 13th. Many actives and pledges were in attendance. Refreshments were served. Everyone had a good time,

including Brother Van Wingen, pledge Sweet, and yours truly.

The pledges have been working hard on their project. Each man is to sand and finish one chair for the dining room.

On Saturday, April 27th, the annual Founder's Day Celebration was held in the Terre Haute House. In conjunction with it, Kappa celebrated its 50th year here at Rose. Many alumni and delegates from neighboring Chapters were present to assist in the festivities. Dinner was served with dancing afterward. Music was furnished by Jess Knowels and his orchestra. Everyone enjoyed himself.

Well, it seems that's all the news for now. All the Brothers and myself would like to take this opportunity to wish everyone the very best possible summer. So work hard, make lots of money, and we hope to see you all next fall. Bye for now . . .

Eugene Amick

ALPHA TAU ALPHA

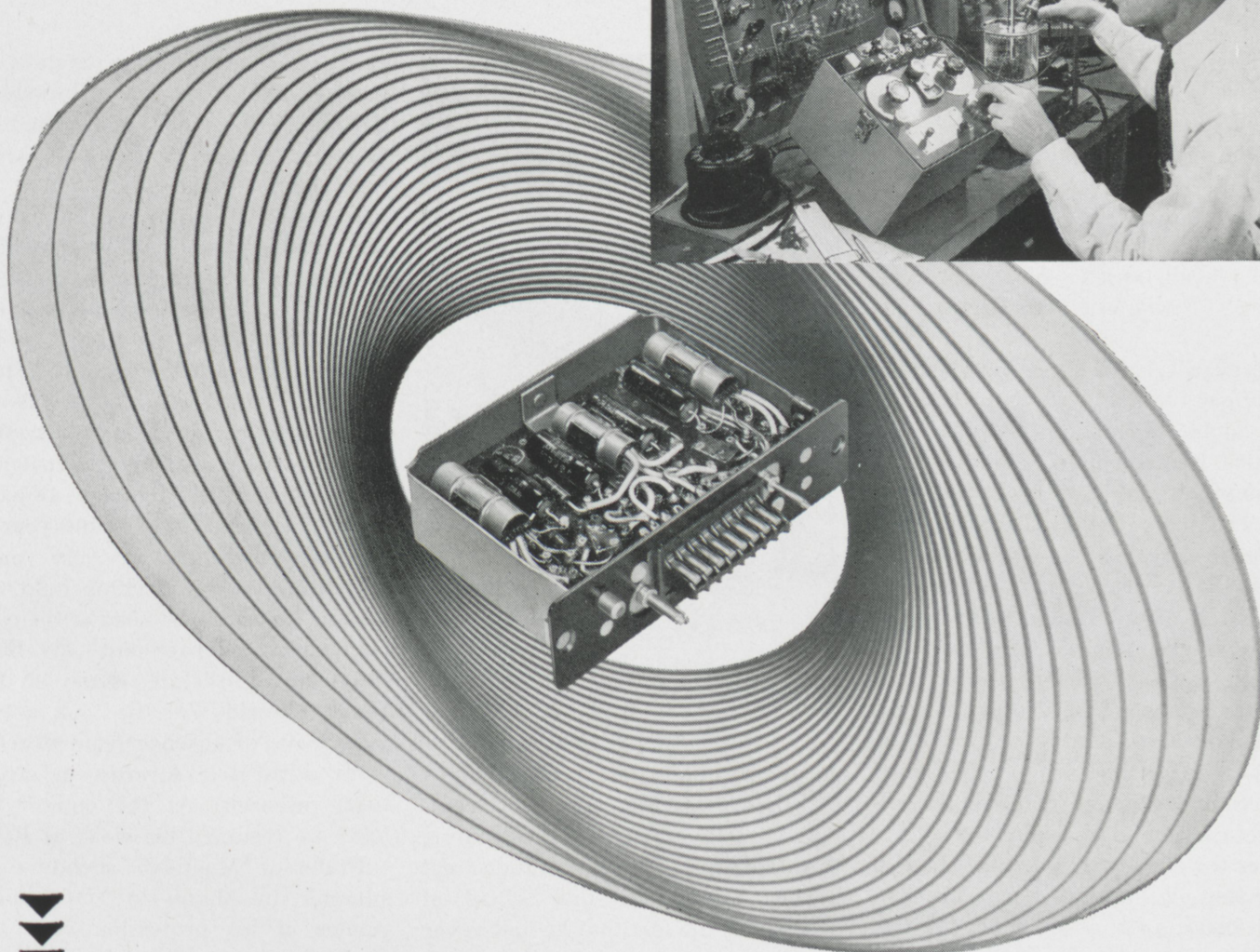
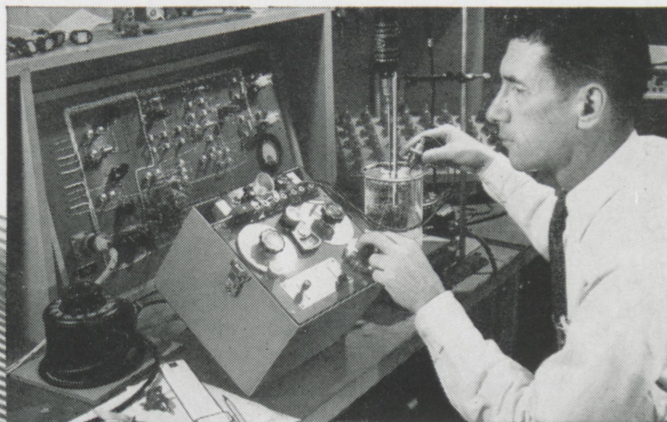
The Alpha Tau's spring fix-up program includes the installation of a new parking lot at the rear of the house. Many thanks are due several of the actives and the pledge class for the vigor of the clean-up campaign.

The pledges seem to be shaping up in proper style. They got into an unusually festive mood a few weeks ago and attempted to lock up the actives in their own meeting. In keeping with their gay sprits, the actives sponsored a little party in their honor.

(Continued on page 38)

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"MR. MAC"

By Tom Hale, soph., m.e.

Ye men of Rose, and others too,
Here's a tale that you must hear
I'll tell to you the story of
One helluvan engineer.

He is an ever smiling man,
He's from the state of Maine,
He heads the C. E. D. at Rose
He's Edward A. MacLean.

Edward A. MacLean was born in Augusta, Maine. When he started his higher education, he selected a school in his home state, the University of Maine. His first stretch at the university was somewhat shorter than he had expected. He had just completed his Junior year when the rumblings of war across the waters caused him to leave school for service in the United States Army. He served as 2nd lieutenant in the infantry. At the close of his hitch in the army, he resigned his commission and resumed his college career, graduating two years after the class with which he started.

After graduation he purchased a big black pair of engineer's boots and started right to work. His first job took him to Three Rivers, Canada, where he served as assistant to the resident engineer.

His next venture took him to a teaching position at the South Dakota School of Mines. This was his first teaching job, and during his three years there, he taught freshman drawing, descriptive geometry, surveying (including mine surveying), applied mechanics, strength and materials, structures (analysis and design), and irrigation. The fact that he had never been inside of a mine made his teaching of mine surveying a two way learning process. He taught the students the math and



Professor Edward A. MacLean

surveying, and the students, most of whom were from mining communities, taught him the mining terminology. His only other real problem, while at the School of Mines was the fact that he had never seen an irrigation ditch before he started teaching the subject. This caused him to have to do some cramming to keep ahead of the class.

He did, however, have some time off during the three years in South Dakota. One day in December he met a charming young school teacher, Miss Ursula Veter. The happy couple were married the following August. They have a daughter, Mary Cate, who is now teaching at Charlottesville, Virginia.

After his first three years of teaching, Professor MacLean decided to go back to school as a student for a while. He first took a summer of

graduate work at Iowa State College. He then went to the University of Illinois, where he was awarded his Master's Degree in civil and structural engineering.

His next teaching position took him to the great southwest, where he spent a few years at Texas A. & M. as a professor of structural engineering. Later, the desire to return once more to the beautiful state where he lived as a boy, was influential in his decision to accept a position with the Bridge Division of the Maine State Highway Department. He stayed there nine years.

At the completion of these years, he re-entered the teaching field, accepting a position as head of the civil engineering department at Rose Polytechnic Institute. Early in the Second World War, he took a two year leave of absence from Rose to work with Bell Aircraft in structural research. At the end of his leave he resumed his work at Rose.

Professor MacLean spends each summer in Maine in active pursuance of his profession with the Highway Department. In this way he keeps in practical contact with the subjects he teaches.

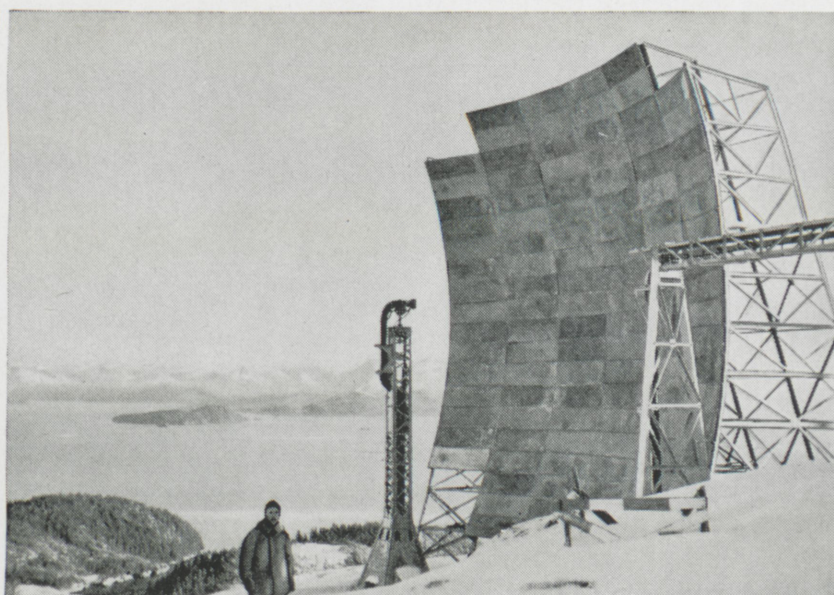
His outside interests cover as wide an area as his professional ones. He is chairman of the convocation committee at Rose. He enjoys ice skating and has moved over the ice at speeds in excess of forty miles an hour, with the aid of sails. He loves swimming and water sports. He appreciates and enjoys good music, and reads widely.

We at Rose are indeed lucky to have Professor MacLean on our faculty. We are proud of our association with this truly great engineer and teacher.

How John Peacock met "White Alice"



John M. Peacock, B.S.E.
in Mechanical Engineering,
Princeton, '47.



One of the huge tropospheric antennas used in the "White Alice" project. These screens pick up the "scatter" of UHF radio signals beamed from more than 150 miles away!

"I met 'White Alice' at Bell Telephone Laboratories," says John. "That's the code name for the communications system linking defense installations along 3100 miles of Alaskan borders.

"Laboratories people had made a basic survey to determine the kind of system needed. I was assigned to the group that developed tropospheric antennas for over-the-horizon UHF radio transmission.

"Besides the usual critical problems involved in systems of this sort, we had some extraordinary factors to deal with, too. There were problems of snow. The structures had to withstand 150-mile-an-hour winds. And research showed that in the Arctic up to sixteen inches of ice could accumulate on the antennas. We had to design them to be strong enough to support this weight without collapsing. But the antenna would not function properly with this much ice

on its face, so a de-icing system was devised to limit that ice to an inch or less.

"We had to work fast, on a very tight time schedule, in order to beat Alaska's winter close-in. And we did. From start to finish, 'White Alice' was an exciting and interesting project. But now I'm working on another over-the-horizon radio system that's just as absorbing. By the way—it's to be in Florida!"

John M. Peacock has been a Mechanical Engineer with Bell Telephone Laboratories since 1953. Able, imaginative young engineers and scientists will find interesting and rewarding career opportunities throughout the Bell System—at Bell Telephone Laboratories, with Bell Telephone Companies, Western Electric and Sandia Corporation. Your placement officer can give you more information about all Bell System Companies.

BELL TELEPHONE SYSTEM



Alumni News

By Max Hippensteel, jr., e.e.

'18 **John C. Rector**, sales manager, Industrial Insulation Division, Philip Carey Manufacturing Company, died recently of a heart ailment. Mr. Rector had been associated with Philip Carey since April 1, 1923, when he joined the company as manager of the roll roofing department.

In January, 1924, he was appointed district manager of the New Orleans area where he remained for 10 years. Subsequent promotion placed him in charge of districts at Indianapolis, Pittsburgh, Louisville and Cincinnati. In May, 1950, he was named to the job he held at the time of his death.

Before joining Philip Carey, Mr. Rector was chief construction engineer for Standard Oil Company of Kentucky at Louisville. He served with Army Ordnance during World War I.

'22 **Eubert F. Taggart**, ee, General Electric Company, Cleveland has been appointed Director of Electric Equipment Division, Business and Defense Services Administration of the U. S. Department of Commerce. On temporary loan by G. E. to the government, he will be located in Washington, D. C.

The Electric Equipment Division integrates defense production and mobilization programs with industries long-range plans for maintaining civilian production and employment. As director, he will coordinate the activities of the efforts of the Office Defense Mobilization and the electrical equipment manufacturers nation-wide.

Mr. Taggart, Manager of Market Planning and Development for the G.E. Apparatus Sales Division,



Eubert F. Taggart

has been associated with the electric utilities industry for 35 years. He has served in various management positions with G.E. in Cleveland since 1925. From 1942 to 1946 he was with the U. S. Navy serving as a Lieutenant Commander.

'32 **Albert L. Ahlers** is being for the past 19 years with Mengel of America. He has been associated Company, a subsidiary of Container Corporation, and was responsible for building their Fulton, N. Y. plant in 1946.

Ahlers will head all corrugated box plants operations of Europe Carton, A.G., a Western Germany subsidiary of Container Corporation.

He will assume his new duties March 1, and will be accompanied to Germany by his wife and daughter.

'36 **John B. West**, me, district development engineer, Alum-

inum Company of America's Atlanta district sales office, has been elected a director of the National Association of Corrosion Engineers.

Mr. West joined Alcoa in 1936. As a member of the company's jobbing division, he was active in the development of fabricating procedures and products for magnesium alloys. He was named assistant chief engineer of Alcoa's jobbing divisions and was active in the development of fabricating procedures and products for magnesium alloys. Mr. West was named assistant chief engineer of Alcoa's jobbing division in 1944, and accepted his present position in 1945.

'51 **Eugene N. Schroeder**, ee, has been appointed Staff Engineer in the Applied Research and Advanced Development Department at the International Business Machines Corporation's Owego Plant.

Joining IBM in June 1951, Mr. Schroeder was assigned to Development Engineering as a Design Engineer. Transferred to Transistor Circuit Design in October 1954, he became an Associate Engineer in September 1955. He was assigned to the Applied Research and Advanced Development Department in February 1956. Mr. Schroeder has credits in the Syracuse Graduate Training Program, credits in the IBM School, and has taught an IBM Class in Transistor Circuit Design.

'56 **George T. Rezek**, me, has become a member of the Reactor Engineering Division of Argonne National Laboratory as an Assistant Mechanical Engineer. Prior to joining the Laboratory, Mr. Rezek was associated with Goss Printing Press Company.



Arne Steivang and Charles Baumann of Federal Bakery Co., Winona, Minnesota, receive engineering service and product data from Stan Nelson (left), of Standard Oil, to help keep maintenance costs low on Federal's truck fleet.

How to write a success story

STANLEY NELSON, automotive engineer, is typical of many young men we like to tell about in the Standard Oil organization. He keeps proving to be the right man in the right job as he advances with us.

Stan likes engineering, of course. He graduated from the University of Minnesota with a B.S. degree in Mechanical Engineering in 1950.

He likes people. He especially likes to get into business problems with them where he and his company can help. Truck maintenance, lubrication, and fuel consumption are big items to fleet operators, large and small, who have found that help from Stan pays off—for them.

And he likes selling. He functions frequently as a key man for the sales department. His

intelligent analysis of a problem in his field may either improve our service to a valued customer or help us to secure a new one.

He likes to keep moving, too, and he's done that. He held several sales positions in Minnesota and attended Standard's intensive Sales Engineering School in Chicago before being promoted to his present position in which he works out of the Mason City, Iowa, division office.

As men like Stanley Nelson earn their way upward in our organization we have frequent openings for ambitious college men to follow them. You might find a career in engineering, research or sales with this stable and progressive company rewarding, too.

Standard Oil Company

910 South Michigan Avenue, Chicago 80, Illinois



EDIBLE RADIO

By John Kassebaum, jr., e.e. and Robert Hall, soph., m.e.

F.M. SIGNAL PASSES THROUGH BODY

A "radio pill" that sends out FM signals to medical researchers as it passes through the human body was demonstrated recently for the first time at the Rockefeller Institute.

Designed for research in the intestinal tract, the new "pill" is a plastic capsule one and one-eighth inches long and four-tenths of an inch in diameter. It is the world's smallest FM radio broadcast station.

The "radio pill" has been developed and tested jointly by the Rockefeller Institute, the New York Veterans Administration Hospital, and the Radio Corporation of America. It was designed by Dr. V. K. Zworykin, and his associates, as it had been envisioned by Dr. John T. Farrar.

Seen Useful in Medical Research

"The 'radio pill' seems to offer many possibilities as an important new tool in medical research," said Dr. Farrar. "It can be swallowed like any other medicinal capsule without discomfort, and will permit measurements on internal organs with minimum psychological and physical disturbance to normal bodily functions. It is hoped that the pill will prove valuable in studying human digestion and absorption in normal and pathological states. The new information which may be obtained on the physiology of muscular contractions is expected to be important in understanding gastrointestinal disorders."

Electronic Components of the Pill

It consists of a tiny transistor, an oscillator, a ferrite cup inductance core and other circuit elements, and a minute, replaceable storage battery

which powers the oscillator and has a life of fifteen hours. This battery is similar to the one used in the famous proximity fuse for anti-aircraft shells during World War II.

Heart of the capsule is the oscillator which is so sensitive that its frequency varies with changes in the pressure to which the "pill" is exposed. Information about these pressure changes is transmitted continuously in the form of FM radio signals that carry for a distance of several feet. These signals are picked up on an outside FM radio received when an antenna is held close to the body.

When the "pill" is swallowed by the patient, its course through the gastro-intestinal tract can be traced by fluoroscopy or other means. Since it has magnetic properties, it can be manipulated by magnetic forces outside the body. The capsule can be recovered and re-used in later experiments.

Studies involving use of the "radio pill" are being carried out in the New York Veterans Hospital, for the time being at least, with the patient under continuous observation. In its present stage, the "pill" is an experimental technique. Its commercial possibilities will be evaluated following further extensive laboratory tests and experiments.

FIRST U.S. ATOMIC POWER PLANT POSES NEW CONSTRUCTION PROBLEMS

Building the nation's first utility nuclear generating station at Shippingport, Pa., has presented many new problems — some that have been solved by rather unorthodox methods.

As a prime example, the roof or top slab of the vapor container enclosure is concrete, five feet thick. This slab is some 60 feet above the base and could not be supported by the vapor container itself. To support the freshly placed concrete of these slabs on conventional forms would have required massive falsework. Instead precast roof sections, two feet thick and weighing 10-to-20 tons were constructed. After curing they were hoisted into place, with a maximum clearance of one inch when placed on the previously poured wall and haunch sections. After grouting into place, these precast slabs became, in effect, forms for the additional three feet of concrete necessary to make up the total thickness.

An extremely tight schedule was setup and has been followed from the start of construction. To maintain progress, concreting proceeded throughout the Winter. To prevent freezing and to provide adequate curing, a low-pressure boiler was brought in, and saturated steam was piped under the canvas enclosures over all the fresh pours.

Water presented another problem. Excavation for the turbine room foundation uncovered a 15-foot blanket of wet clay. It was excavated and some 25,000 cubic yards of gravel were used to back-fill, providing adequate support for the 12-foot-thick turbine room mat.

The plant's capacity is 60,000 kw, obtained by operating three of the four team generators. The plant's single turbine-generator has a maximum capability of 100,000 kw, to allow for possible improvement in heat energy output.

WHAT'S YOUR OPINION?

By Paul Cella, jr., c.e.

Perhaps one of the simplest-sounding, yet most thought-provoking, questions which an engineering student can ask himself is, "What is an engineer?"

At first thought, the answer to this question may appear simple, but, just as an experiment, take out a piece of paper and try to write down your own definition of engineering or an engineer. I think that you will find this a pretty hard thing to do. However, it seems only reasonable to assume that a person preparing to enter the engineering profession should have a fairly concrete idea of what his profession entails.

In order to get a better insight into this subject, I asked several people here at Rose for their definition of engineering or an engineer. Here is what they said:

F. L. Wilkinson, Jr.: "Engineering is a scientific art by means of which the phenomena of nature may be utilized for the economic and social benefit of mankind."

S. G. Bankoff: "An engineer is a person who applies the principles of physical and chemical science to control the forces of nature for the benefit of society, usually in an economically competitive fashion."

I. P. Hooper: "Engineering is the application of natural resources to the betterment of human welfare."

E. A. MacLean: "An engineer is one who transforms the raw materials and forces of nature to the end that his fellow man may lead a fuller and more satisfying life."

P. H. Lewis: "An engineer is a member of a professional team,

who works by applying the sciences, such as mathematics, chemistry, and physics, to the development of ideas that involve the functional use of the resources of our universe.

M. R. Potzler: "An engineer is a person who applies a combination of common sense and a knowledge of science to an industrial process."

By comparing these definitions, we can see that all of them are similar, yet no two of them are quite the same. To summarize these definitions, to formulate an all-inclusive definition of engineering would be almost impossible. But, by studying these definitions, we can, perhaps, arrive at a better understanding of what engineering is.

In the first place, it is evident that an engineer must have a specialized background. He must have a working knowledge of mathematics and the physical sciences. This means that he must be familiar with the properties of natural resources, be familiar with the physical and chemical changes which may take place in these resources, and be able to express these changes in a quantitative form. The engineer must have enough of this type of knowledge so that he is not only able to understand natural phenomena but is also able to control them. An engineer, then, is a *controller of natural forces*.

Secondly, an engineer must be able to solve problems. This does not mean that he is adept merely at arriving at the answer to a textbook problem; rather, it means that he has the ability and experience to

analyze new problems in such a way that he arrives at the best answer in a given situation. An engineer, therefore, is a *problem-solver*.

In the third place, an engineer must be an economist. Arriving at the best answer often means arriving at the least expensive answer. In the free-enterprise system, the chief motivation is the hope of profit. As this system grows more and more complex, the engineer is called on more and more often to find a way to increase profit. Although the engineer may not himself be the direct receiver of this profit, he is still a very important part of the making of it. An engineer, then, is an *enterpriser*.

In the fourth place, an engineer must use a great deal of common sense. Although he may have received a good education and may have had a lot of experience in technical matters, each successive problem is usually so different from the one preceding it that something besides education and experience is necessary. This necessary element is common sense. Without it, an engineer faced with a new problem is up against a brick wall. An engineer, therefore, is a *practical person*.

In the fifth place, an engineer is part of a team. The days in which an entire process, structure, or product could be developed by a single person are gone forever. Our industrial program has grown so complex that dozens of technically trained persons are often assigned to one facet of a particular development. In order to reach the goal, teamwork is essential. The engineer must be

(Continued on page 42)

Library Notes

By Carson W. Bennett and Anita Walden

With the baseball season already started and the automobile world soon to have its big race in Indianapolis, may we suggest the following books and magazines, which are in the Library, for your reading.

Clutton, Cecil. *The Racing Car; Development and Design*.

Clymer, Floyd. *Indianapolis 500-Mile Official Yearbook* (we have 1953, 1954, and 1955).

Hebb, David. *Sports Car Rallies, Trials and Gymkhanas*.

Holzman, Robert. *General "Baseball"* Doubleday.

Marsh, Irving T. *Best Sports Stories*, 1952.

Shaw, Wilbur. *Gentlemen, Start Your Engines*.

Simant, Marc. *How to get to First Base*.

Smith, Walter, *Out of the Red*.

Here's an interesting statistical item quoted by Borden Dupee, president Great Books Foundation, in the *Saturday Review*: "Today, at any time, only 17 per cent of the adults in the U.S. may be found reading a book. But in 1937, 29 per cent were found reading books. In England, however, 55 per cent of the population at certain times may be found reading books. And 42 per cent of the homes in America are without bookcases or bookshelves. We spend more public funds on two airplane carriers than in the combined budgets of the 7,500 public libraries in the United States."

FROM THE NEW BOOK SHELF

The Bridge at Andau, by James A. Michener.

There was a bridge at Andau, and if a Hungarian could reach that bridge, he was nearly free. By an accident in history, one of the most inconsequential bridges in Europe became one of the most important

bridges in the world. Across it, during a few flaming weeks, fled more than twenty thousand people who had known communism and rejected it. In these few weeks the world learned with a dreadful clarity how bankrupt communism had become as a system of government.

James A. Michener was at that bridge, which is in Hungary near the Austrian border. He personally helped lead many Hungarians out of their suffering, gallant country. From what these victims of Russian bestiality told him, he has drawn a picture of Hungary under Russian domination, up through the final terror of the rape of Budapest and its aftermath.

This is the story of the revolution told in terms of the people who lived it—the writers and philosophers who proposed it; the students who initiated it; the boys and girls who wrestled with tanks barehanded; and the workers, the propaganda darlings of communism, who resisted both communism and Russia to the death.

The Bridge at Andau is James Michener's urgent warning to any nation or group that allows itself to be swept into the orbit of international communism. "There can be only one outcome: terror and the loss of every freedom."

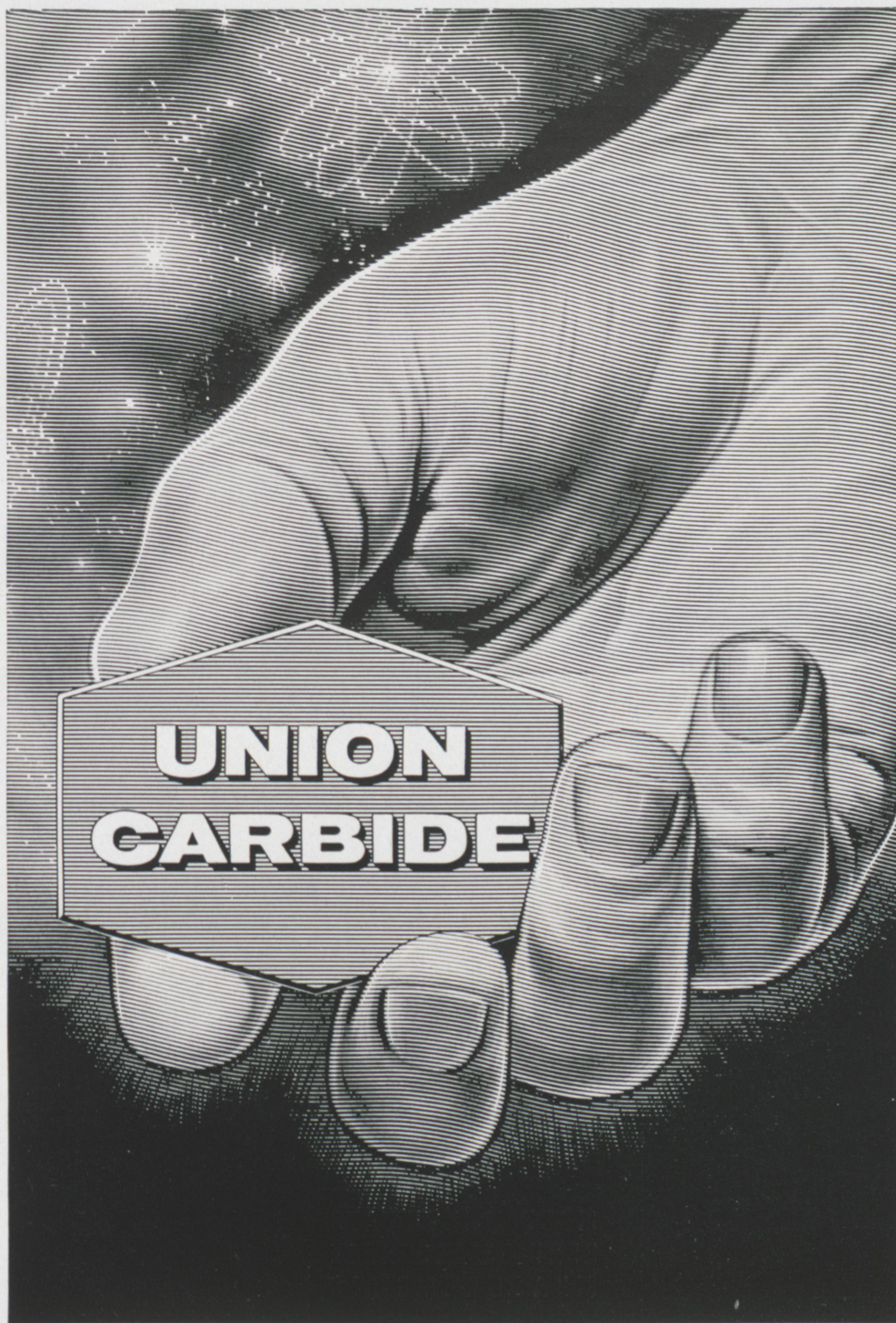
To get this story Michener spent six weeks in Austria and interviewed hundreds of refugees. Out of their experiences, he has built an authentic account of epic heroism—*The Bridge of Andau*. This book is a testament to the freedom fighters of Hungary who destroyed the great Russian lie.

The Racing Car; Development and Design, by Cecil Clutton.

It has been said many times that "racing improves the breed", and it cannot be denied that the touring car of today has always profited greatly by the lessons learnt from the racing car of yesterday. Previous volumes in this series have examined the development of the production car from the beginning of the industry up to 1930, but for a thorough understanding of the evolution of the motor-car it is necessary to appreciate the development of the racing machine, which has been the progenitor of many innovations in automobile design.

Cecil Clutton, Cyril Posthumus, and Denis Jenkinson here trace the genealogy of the Grand Prix car from the 1895 Panhard to the Mercedes-Benz 300 W.196, Maserati 250F and Type 251 Bugatti of today; they also include a postscript on the lines which design may be expected to take in the future. The most important cars through the years are described and discussed in detail, while a number of "voitures", and many of the interesting but less successful offshoots from the main theme of development, also receive their attention. The story is told in an incisive and readable manner, and yet sufficient technicalities are included to satisfy the mechanically-minded enthusiast and to make the book valuable as a work of reference.

The 105 illustrations include a series of 39 whole-page drawings of the outstanding designs, specially prepared by George A. Oliver, and a collection of carefully selected photographs showing mechanical details, the cars in action and reproducing something of the "atmosphere" of the racing circuits at all periods in the history of the Sport.



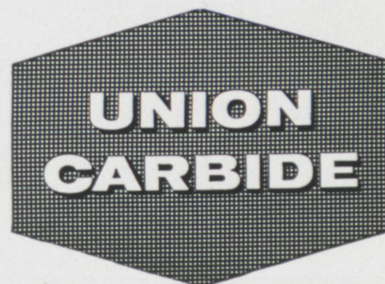
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FRATERNITY NOTES

(Continued from page 28)

The "Terrible Taus" are off and running again for the I. F. softball trophy. In our first outing we beat Sigma Nu 9-4. Our spirits are up and the chances look very favorable for the ATO's to win the trophy this year.

Song Director Jim Stott is presently expending every ounce of effort to prepare the Tau's for the I. F. Sing. Things are going well at this stage and we're hoping for the best.

Congratulations to Bill Weil, who pledged recently.

Spring is having its usual effect on the Taus as far as the ladies are concerned. The following will no longer be bachelors come next June: Jim Martin will wed Joyce Swickard; Bob Travis, Lou Ann Tange-man; Jim Griffith, Sherry Bonham; and Dave Thomas, Carolyn Cord. Bob Hall also fell victim to the

season and became engaged to Miss Kay Miller.

The fraternity elections took a long time this year because we had many good men from whom to choose. Dick Trueb is the new Worthy Master; Ernie Knoy, Worthy Chaplain; John Williams, Treasurer; Norm Grimshaw, Worthy Keeper of Annals; Tom Reese, Worthy Scribe; Frank Larr, Worthy Usher; and Chuck Skidmore, Worthy Sentinel.

Bob Hall

LAMBDA CHI ALPHA

Theta Kappa's cigar supply received a big boost when Senior Chemical Bill Small began passing out the stogies. The occasion was the arrival of the Smalls' first child, daughter Cynthia Kay, who checked in at 8:10 p.m. April 14. She tipped the scales at 7 lbs. 1 oz. The proud father reports the little one only wakes him up once a night.

Saturday, April 13, was to have been the day of the great garage wrecking. As there had been some

doubts concerning the stability of the present structure, it was decided to raze it. So when the wreckers got down to brass tacks, or rather the brick walls, it was found that the building's sturdiness was underrated. However not to be deterred, they turned their efforts to the adjoining wall and incinerator, and here were rewarded with success. A new incinerator is to be built still leaving access to the alley.

Lambda Chi's softballers got off on the right foot in the I-F league by edging Theta Xi 10-7. Let's keep going gang and keep the slate clean.

On March 30 Indiana University was the host for Lambda Chi Alpha's Midwest Conclave. Rose delegates included Dan Mook, Barlow Brooks, Rick Ressler, and Jim Oakes.

You would never know it was spring by the way the men of Theta Kappa jealously retain their pins. No one succumbed to female charms this month as was the case last month.

Dan Mook

Woodridge Motor Court

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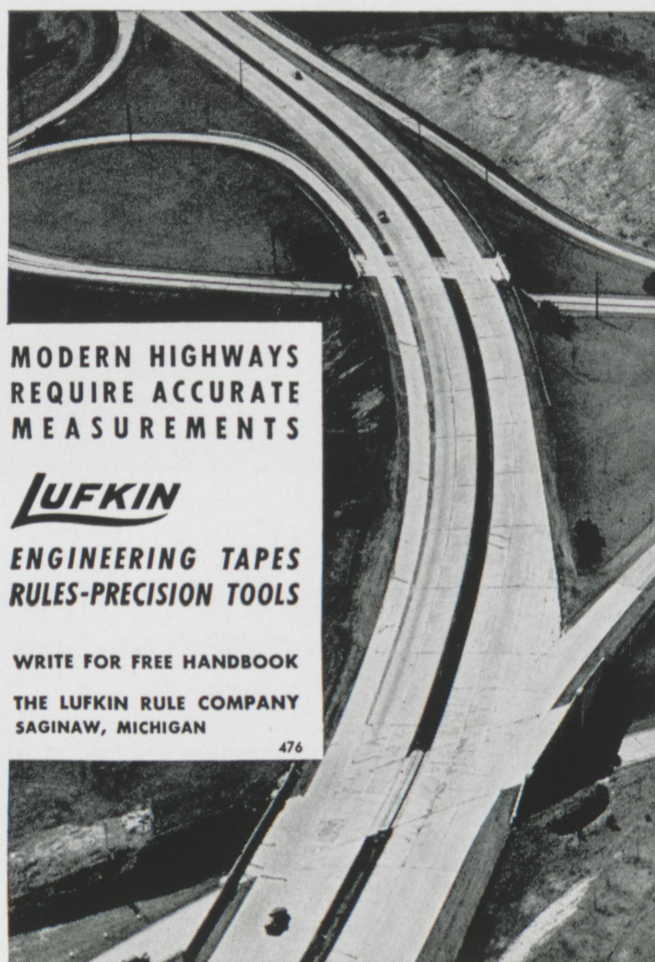
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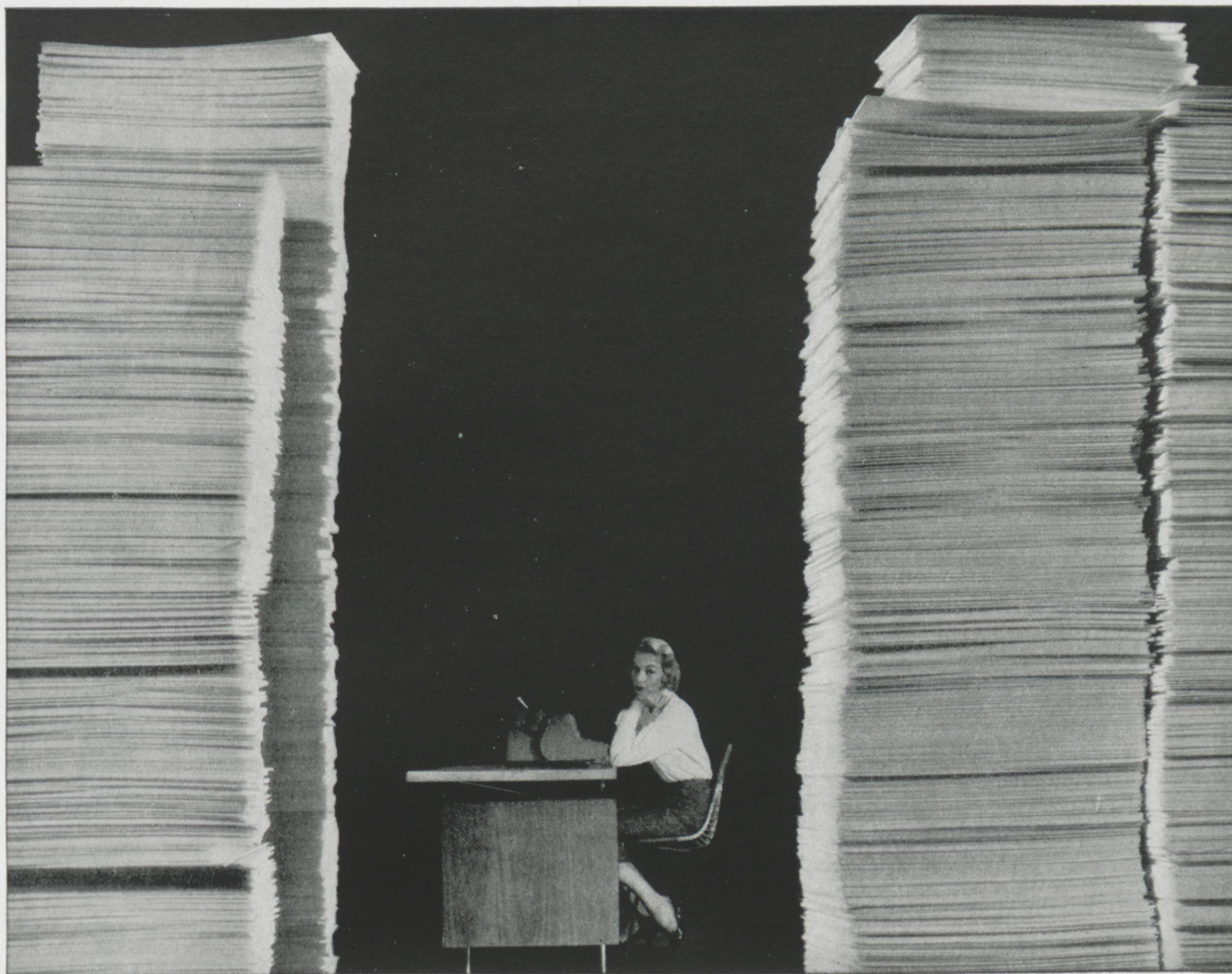
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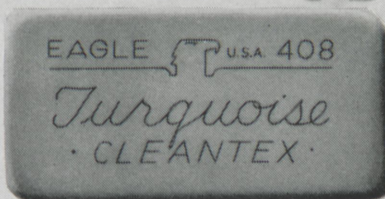
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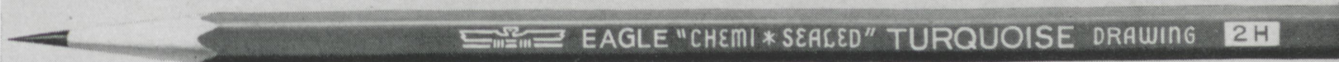
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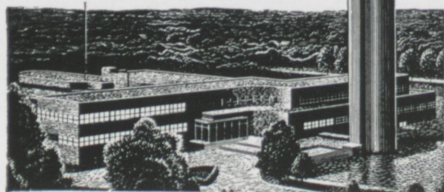
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WHAT'S YOUR OPINION

(Continued from page 35)

able to work with scientists, mathematicians, and technicians in such a way that each contributes his special knowledge, and each understands the others. An engineer, then, is a member of a team.

In the sixth place, an engineer must fulfill the demands of his profession. This means that he must maintain a professional status at all times. The engineer never compromises his professional principles — even if not doing so would mean losing his job. The professional integrity required of an engineer is of just as high an order as that required of a physician; in fact, it may even be considered to be higher. If an engineer were to design a structure with a safety factor smaller than that normally used, for the purpose of cutting the cost of materials, he would be endangering the lives not of one, but of hundreds of people. Even under the strongest pressure, an engineer remains, therefore, a professional man.

Lastly, and most important, an engineer must remember that his work will profoundly affect the life of his fellow man. Everything he does he must do in the best interests of society. This is probably the hardest requirement for the engineer to keep in mind, because it is the hardest result to predict. Yet, it remains the most important, for there is no sense in an engineer doing anything unless the end result will benefit mankind. An engineer, then, is a servant of society.

To summarize, an engineer is many things. He is a controller of natural forces, a problem-solver, an enterpriser, a practical person, a member of a team, a professional man, and a servant of society. If he is able to live up to all of these requirements, there can be no doubt but that he will be a successful man and will live a satisfying life.

COLOR TELLS ALL

(Continued from page 21)

sensitive to micro amounts.

When a column is used, the two methods described for recovering the separated compounds may be applied to determine how much of each compound is present. Often the solutions containing these compounds are evaporated to dryness and weighed.

For paper chromatography, the spots of the separated compounds are measured for area and color density. These measurements may then be transferred into the amount of each compound present. An alternate method consists of extracting each compound off the paper with a suitable solvent; these solutions may then be evaporated and weighed.

Future Development

Chromatography's future is a bright one. Almost everything seems separable, providing time is spent to find proper absorbents and solvents. To the research man, chromatographic methods are an ace in the hole—to be used when conventional methods fail. As the problems become more difficult, these methods of chromatography will find even more uses.

Taking the guesswork out of the selection of solvents and absorbents is a major goal. Tables of the "RF" values for compounds in many solvents are now available and very helpful in shortcutting laboratory research. However, experts still disagree on some factors influencing separation. In general, much work must be done to obtain a true understanding of the physical forces at play and to formulate mathematical equations describing these forces.

Because of expense, chromatographic separations have found little use in commercial operations. The central difficulty lies in converting from a batch process to a continuous one. However, recent efforts to improve chromatographic processes and the opening of two plants provides hope for a new industrial operation.

HIGHER EDUCATION

(Continued from page 17)

short, bend every personal effort to the obtaining of a diploma. Earning one's way through college by part-time work was recommended by a sizeable majority of the respondents (68%). "Stay in school" is the advice they give; earn money, borrow it, or go to school on credit, but drop out because of finances only if there is absolutely no possible alternative.

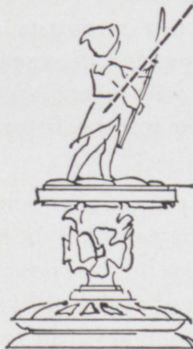
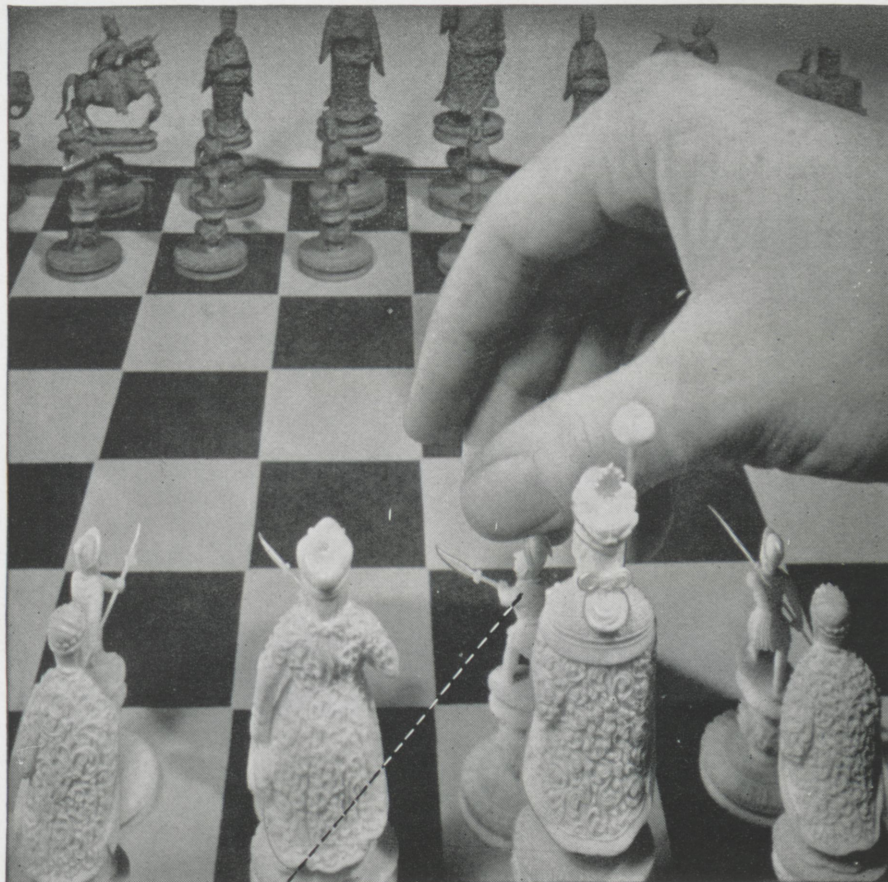
Few of these graduates recommended scholarships. This is partially explained by the fact that few of them held scholarships while in college, since most of them went to school at a time when scholarships were not as prevalent as they are today. Therefore the idea of a scholarship probably did not occur to many of them. However, the absence of mention of scholarships is significant enough to leave us with the suspicion that many graduates would prefer students to earn money rather than be awarded it.

IX. If you were starting life again, would you attend the same college and take the same program of study?

A vast majority of the engineers (85%) were completely satisfied with their college education, and many of those who replied negatively explained that they had been forced to attend an inferior school because of finances. Others said that they were dissatisfied with the course of engineering they had taken, and if they had studied something else, they would have chosen another institution. But the biggest part of the engineers were overwhelmingly sold on the values they have received from their alma maters.

Friends, these are the facts as nearly as General Electric and I can present them, so it is now up to you to evaluate yourself and Dear Old Rose on the basis of what college men of former years now think of their higher education.

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MOTOROLA

THINK

(Continued from page 27)

unification of Engineering Science and Liberal Arts is to provide the broad foundation necessary for a depth of understanding of engineering and engineering principles that the traditional engineering education does not when it is focused primarily on the art and skill aspect of engineering. Thus, the engineering-scientist is fitted first for the stimulative field of creative research with a graduate level of specialization in depth.

It is noteworthy that one of the foremost of the eastern schools, after years of study, has concluded that a program essentially embodying both variations of the new philosophy is the optimum one for achieving the objective previously mentioned. Because of its advanced nature and the care spent on its development, it is of particular interest. One might even venture to label the new program as a model upon which to build any comprehensive Engineering Physics curriculum. For this very pertinent reason, I should like to bring it to the attention of the reader.

Cornell wanted a new approach to the training of men who would one day be needed to take part in the rapidly expanding fields of industrial research and development. After much study, in 1946 they concluded that the departmentalized engineering curriculums and the depth of pure science studies were both, of themselves, inadequate to train students for industrial research and advanced development, engineering primarily because it did not provide sufficient depth in mathematics, physics, and chemistry.

What they concluded in 1946 has been justified by the results stemming from the phenomenal growth since then of industrial research, culminating in a virtual boom in the

establishment of new industrial research laboratories and the swelling expansion of existing ones. The American industrial future is largely tied to these research and development facilities. As a consequence of the Cornell University prophecies, studies were instituted toward developing a type of training program adequate to produce trained men for filling those positions.

Cornell's report substantiates the boom in research facilities. In 1920 there were only about 300 known industrial research laboratories; in 1940, 2,200 labs employing 60,000 scientists and engineers; at present, there are 3,500 labs employing 160,000 scientists and engineers. Keeping pace with this new trend in basic industrial progress is the federal government, which at present employs between 75 and 100 thousand scientists and engineers. In summation, statistics show that over one-third of our scientists and engineers are engaged in research and development with even larger numbers predicted for the future.

The basic philosophy behind this particular program has been to integrate, in so far as possible, the several fields of study (physics, mathematics, chemistry, the engineering sciences) in such a way that the electrical and mechanical properties of materials are connected with their particular atomic constitution; and to study the material at hand with as much mathematical technique as the student has acquired at any one time.

The Cornell program consists of ten semesters of work. It was felt that by extending the program to five years, the entire fifth year would be equivalent to an industrial training program in advanced research and development, thus allowing the holder of a B.S. in Engineering Physics to immediately enter the industrial laboratory upon graduation and commence his valuable contributions to society.

The school has found that student demand for this curriculum has steadily increased in spite of its being the most rigorous technical course in the entire university. At present, about 10% of the entire engineering student body is enrolled in the Engineering Physics curriculum. By and large, it has been found that a graduate with a degree in this field has a greater knowledge of physics and mathematics than a four-year physics major in the College of Arts and Sciences.

Data states that about one-half of the graduates of the course have been accepted for graduate study in leading schools with no reservations, and that these studies range throughout the disciplines from Physics and Applied Mathematics to Aeronautical Engineering. In addition, reports from industry attest to the success of the training program in Engineering Physics. Thus, at least one school has been courageous enough to face a real educational problem of the times and has been interested enough to take effective steps toward eliminating it. In so doing, it has attempted to fulfill Dean Elgin's (Princeton) criteria of a basic engineering program and at the same time help provide this nation's supply of creative research and development talent.

If industry is to have the personnel to man its multiplying laboratories, if it is to have the talent to handle the increasing operational complexities imposed by modern technology, our educational system must grow and improve in proportion to the growth and advance of industry. In fact, it should be a step ahead!

Thus, the issue has been clearly stated by men of understanding and proven reputation, and the case has been presented to the reader whoever he may be. Let each one of us now face the resulting question—How does your school handle the problem? Here is something worth thinking about.

EARTH TAKES INVENTORY

(Continued from page 18)

Ocean Currents

Oceanic navigation is primarily based on the location of currents which enable ships to go from one place to another more cheaply. Currents have a distinct effect on the weather. The most notable example being the gulf stream which moves warm water from the Caribbean northward to England. It is estimated that the warm water elevates England's annual temperature by several degrees.

Glaciology

The study of the polar ice caps is by no means unimportant. Over 10% of the earth's surface is covered by ice, and it is slowly melting. The water from the polar caps, if they were completely melted, could raise

the ocean level 150 feet. This of course would bring mixed blessings. Many coastal cities would be completely submerged, on the other hand new lands would be fit for occupation by man. IGY is going to try to find out the nature of polar ice caps, and just how fast they are melting.

Upper Atmosphere

Upper atmosphere exploration will be carried out on the largest scale ever seen. The U.S. will launch twice as many high altitude rockets as it has in the past decade. Some will be launched from balloons and airplanes so that valuable fuel will not be used to overcome the dense atmosphere near the earth's surface. Rockets launched from planes are called "rockairs", while those launched from balloons are called "rockoons". Rockairs and rockoons are to be used at altitudes up to 60 miles. Above 60 miles, the "Acrobie" rocket will take over and carry up to 200 miles. Above 200 miles

data will be gathered by earth satellites, (some 12 of them). Of primary interest in these high altitude explorations are temperature, pressure, cosmic radiation, and certain mysterious audio noises detected at extremely high altitudes.

Time

There appears to be a certain amount of unsteadiness in the earth's rotation. Universal time (based on the stars) and ephemeris time based on the phase relationship between moon and earth) differ by about 30 seconds. This difference may seem insignificant, but so did the fact that there was ice in the North Atlantic when the Titanic sailed. As the day of space travel approaches Universal time will grow more important.

Maps

The width of the Atlantic Ocean is known within 300 feet, while some islands in the south Pacific are known within 5 miles. IGY will try to fix the land and water masses in their proper places.

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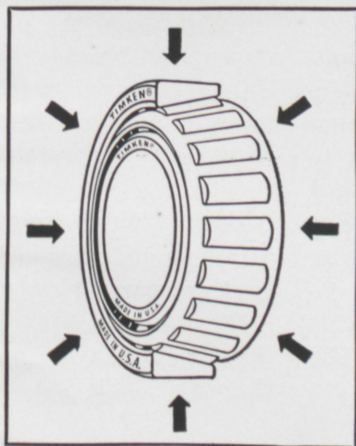
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Some bearings can take loads from the sides—some from above. Because of their tapered design, Timken bearings take *both* radial and thrust loads or any combination. And because the load is carried along a full line of contact between rollers and races, Timken bearings have extra load-carrying capacity.



Want to learn more about bearings or job opportunities?

Some of the engineering problems you'll face after graduation will involve bearing applications. For help in learning more about bearings, write for the 270-page General

Information Manual on Timken bearings. And for information about the excellent job opportunities at the Timken Company, write for a copy of "Career Opportunities at the Timken Company". The Timken Roller Bearing Company, Canton 6, Ohio.

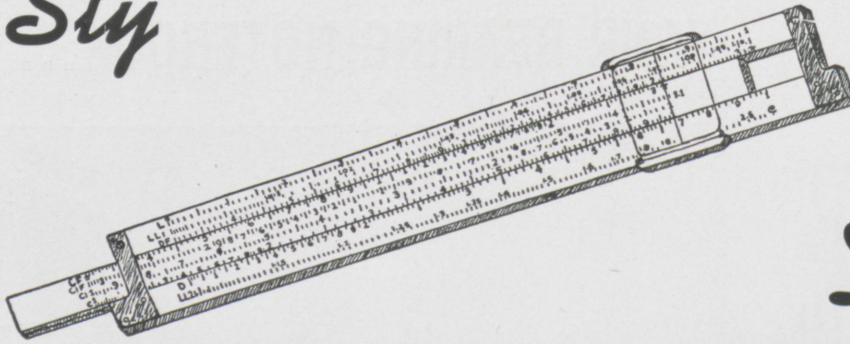
TIMKEN

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER □ THE TIMKEN TAPERED ROLLER □ BEARING TAKES RADIAL ○ AND THRUST → □ ← LOADS OR ANY COMBINATION → □ ←

Sly



Droolings

Stolen by Bill Johnson, fr., and Ron Reeves, sr., e.e.

Joke Editor
Rose Technic
Rose Polytechnic Institute
Terre Haute, Indiana
Dear Sir:

I would like to commend you on the very fine articles that have been appearing in "Sly Droolings." This is truly a most riotous collection of original jokes, gags and stories. I am sure that you must be a person with a marvelous sense of humor. Again I commend you.

Please excuse the crayon, as they will not let me write with anything sharp.

Sam

* * *

The rube strolled into the general store. "Gimme a can of talcum," he requested.

"Mennen's?" inquired the clerk politely.

"It's fer m'wife so make it wimmen's," answered the hick.

The clerk shrugged. "You want it scented?"

"Nope," replied the backwoodsman. "I can take it with me."

* * *

"May I kiss you?" the Ch.E. asked his date.

"Ye gods," answered the sweet young thing, "another amateur!"

* * *

It's the custom at the U. of Michigan for students to give the examining professor a stamped, self-addressed envelope so that he may mail their final exam grades. One student placed a candy Life-Saver in his envelope.

Then it was mailed back to him, the grade was extremely low! and the Professor had replaced the Life-Saver with an aspirin tablet.

The hobo knocked at the back door of a house and asked for a hand out.

"Notice that pile of wood in the yard?" asked the lady of the house.

"I seen it," answered the 'bo.

"Mind your grammar," said the housewife. "you mean you saw it."

"Lady," said the tramp, 'you saw me see it, but you ain't gonna see me saw it!'"

* * *

Bright young thing to oarsman after his crew had lost the big race: "Never mind, dear, you were wonderful. You rowed faster than anyone in the boat!"

* * *

The mama bull, the papa bull and the baby bull set out to go to the fair. After walking a mile the mama bull became tired and sat down to rest. A mile later the papa bull got tired and he sat down to rest. But the baby bull walked all the way to the fair.

Now, there's a moral to this story, and it is, "Sometimes a little Bull goes a long way,"

* * *

He walked her to her front door. She whispered with a sigh, "I'll be home tomorrow night." He answered, "So will I."

* * *

The moon was yellow
The lane was bright
She turned to me
In the autumn night
And with every glance
She gave a hint
That what she craved
Was real romance.
As time went by,
The moon was yellow
. . . And so was I.

One coed calls her boy friend "lightning" because he doesn't know how to conduct himself properly!

* * *

A salesman boarded the train, entered a sleeper, and tipped the porter liberally to put him off at Albany. "I'm a very hard sleeper," said the salesman. "I don't care what kind of a fuss I make, grab me and put me on the platform."

The next morning the salesman woke up and saw that he was on the outskirts of New York. Raging, he sought out the porter and began to bawl him out.

"Man," said the porter, 'you got a powerful temper, but it ain't nothin' compared with the young fellow I put off the train at Albany."

* * *

Boss: "How come you're only carrying one sack, when the other men are carrying two?"

Workman: "Well, I suppose they're too lazy to make two trips, the way I do."

* * *

DAFFYNITIONS

Politician: A man who approaches every problem with an open mouth.

Clergyman: A man who works to beat hell.

Diploma: The man who fixes the pipes.

Janitor: A floor-flusher.

Sleep: When if you don't get enough the night before you wake up half a.

Bars: Something which if you go into, you are apt to come out singing a few of and maybe get tossed behind.



1,000 styles—750 stores—yet photography gives headquarters inventory figures overnight

Thom McAn ends ten-day hand-copying jobs with Kodak's Verifax Copier—now gets complicated sales, size and style data off in a day.

BEFORE, when Thom McAn's merchandise manager or stylist needed word on sales or style trends in certain stores, it took as much as ten days to hand-copy the records.

But today, when headquarters located in New York requests information on any shoe style or store, the New England merchandising center gets the latest facts and figures away in that night's mail. And styling, buying and distributing functions get 24-hour—instead of ten-day—service

on vital stock allotment statistics.

This is because the facts, kept on files of removable panels and cards, can be slipped into a Kodak Verifax Copier and copied, photographically accurate, in a minute.

Photocopying is just one of hundreds of ways photography works today for all kinds of businesses, large and small. It helps with product design, takes kinks out of production, increases sales, improves customer and personnel relations.



Thom McAn calls the Verifax Copier "the kingpin of the allotment control system." It copies a store's style allotment records and width breakdowns and in less than 60 seconds has a dry print ready for the mails.

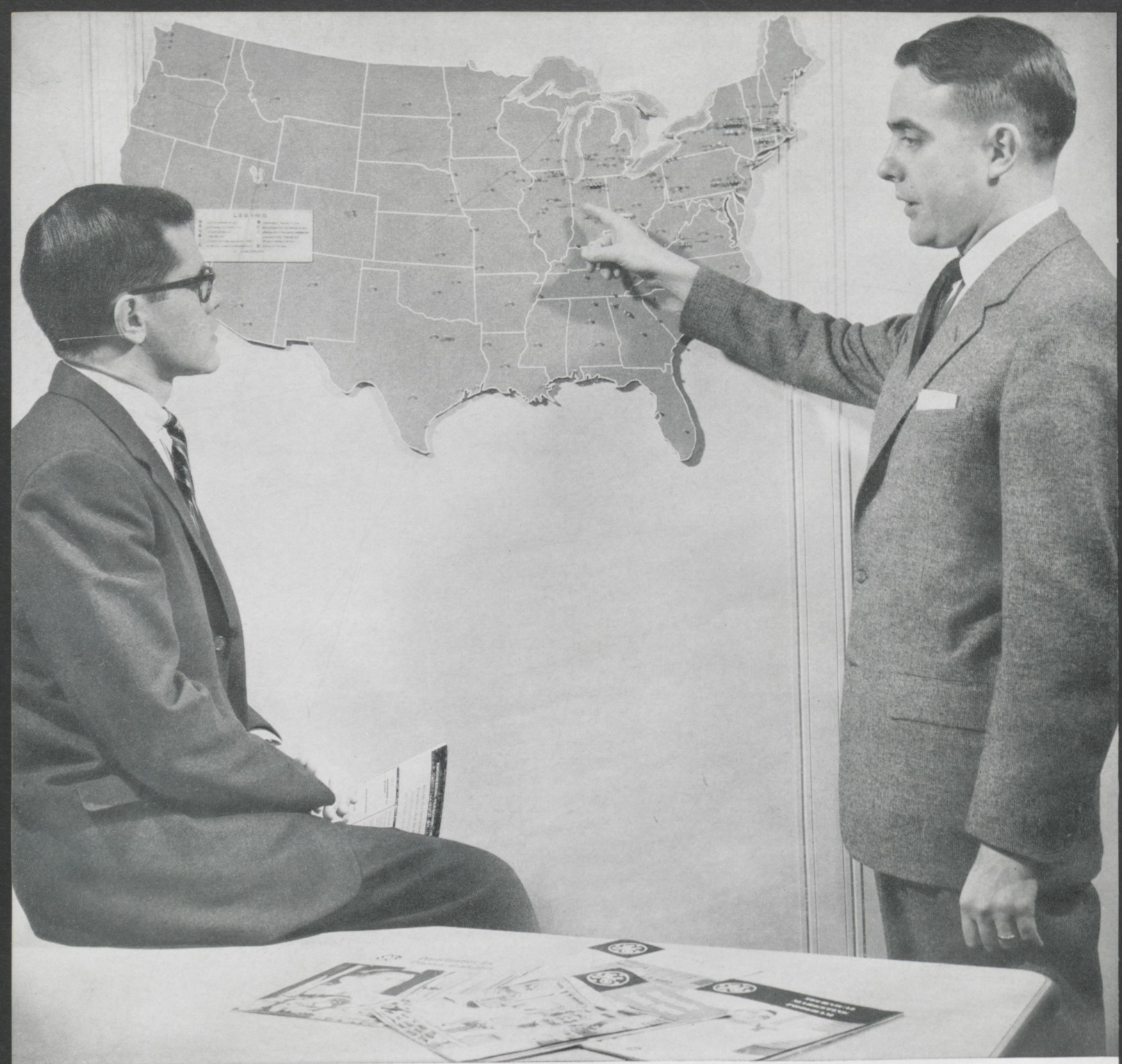
EASTMAN KODAK COMPANY, Rochester 4, N. Y.

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